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TROPICAL DISEASES BULLETIN

IMPERIAL MYCOLOGICAL INSTITUTE
7 MAR 1941

VOL. 38.] 1941. [No. 2.

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Issued under
the Direction of the
Honorary Managing Committee of the
BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street, London, W.C.1.

Price 2/6 Net.] *Entered as Second Class Matter in the U.S.A. Post.* [Annual Subscription 21/-
With Supplement 25/-

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 38.] 1941. [No. 2.

SUMMARY OF RECENT ABSTRACTS.*

II. YELLOW FEVER.

Epidemiology.

In the Gold Coast in 1938 O'BRIEN (p. 88) reported that there were 15 cases of yellow fever, all fatal, compared with 75 in the previous year. Five were in Europeans, of whom 4 were engaged in road work, which shows the risk of living in rest camps or similar places where mosquito control is impracticable. [This finding may indicate that the jungle form of yellow fever occurs in the Gold Coast, and this view is supported by the fact that in the Belgian Congo, in an area where the sera of a considerable proportion of the natives contained protective antibodies, VAN DEN BERGHE found that the serum of a monkey, *Colobus polykomos*, gave a positive protection test, see this *Bulletin*, 1939, Vol. 36, p. 634.] MACKAY (p. 549) refers to the same cases. He states that, in the Gold Coast, mosquito control is only carried out in the larger centres and villages. Increasing road transport facilities may lead to increased risk of spread of infection to regions outside the West African endemic area, and this traffic is more difficult to contend with than air traffic.

SALEUN (p. 550) reports positive protection tests in natives in various parts of French West and Equatorial Africa, and also in certain animals including cattle, camels, horses and sheep. He reports that two protection tests performed on Europeans at Port Gentil, French Equatorial Africa, were positive, but that one of these persons gave no history of fever other than two attacks of dengue, during the period of 9 years' residence in Gabon. The other person also had only had dengue, but had lived in the Antilles some years before, and might have been exposed to infection there.

BABLET (p. 88) shows that viscerotomy is practised in French West and Equatorial Africa. Of 142 specimens examined in 1937 and 1938, 44 per cent. were positive, and of these 7 were from children. He (p. 551) reports the finding of yellow fever lesions in specimens from patients who had died of acute febrile diseases accompanied by jaundice. The majority of these were from West Africa, but it is interesting to note that there were no cases of yellow fever from

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1940, Vol. 37. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

Senegal, which had produced the most a year before. This may be the result of intensive vaccination against the disease. The first positive specimen from Tchad is reported.

SOREL (p. 88) records a case of rural yellow fever in a European in Eastern Oubangui. [It is not clear, and perhaps could not be made clear, whether this was a case of yellow fever transmitted by *Aëdes aegypti* or by other mosquitoes, but no connexion with any other case could be found. It will be remembered that SOPER distinguishes between rural yellow fever, transmitted in country districts by *Aëdes aegypti*, and jungle yellow fever transmitted in the absence of that mosquito. In the jungle variety man is not usually an important reservoir of the virus, but monkeys may be. See this *Bulletin*, 1939, Vol. 36, p. 633.] In Malakal, the Commission on Yellow Fever (p. 88) reports that the proportion of natives whose blood gave positive protection tests has risen from 0 to 18 per cent. in 4 years (Atkey), yet in this period there has not been a single clinical case of yellow fever, and *Aëdes aegypti* is practically non-existent. [This again suggests that the jungle form occurs.]

As an explanation of this phenomenon ATKEY (p. 554) suggests that the virus becomes attenuated in passing from West to East Africa, as a result of local conditions, and may ultimately cease to produce typical symptoms.

DE LOTTO (p. 552) describes a condition seen in Western Abyssinia, which has certain resemblances to yellow fever, but further investigation is necessary before its nature can be determined.

SNEATH (p. 90) discusses yellow fever in British Guiana. On the coast, protection tests are negative in children under 15, and are not frequently positive in older persons. In the interior, however, 118 of 246 males and 8 of 43 females were positive, a disparity which suggests that it is the jungle variety which is concerned, especially as *Aëdes aegypti* is not found in one district in which tests were positive. Special measures are necessary to prevent the introduction of the jungle virus into the vulnerable coastal belt, where conditions would favour its spread. JAMES (p. 88) shows that in S. America urban yellow fever is not increasing, but jungle yellow fever remains a serious problem.

Aetiology and Transmission.

VAN DEN BERGHE (p. 94) found that a neurotropic virus of the French strain, when injected intracerebrally into a baboon, gave rise to virus in the brain which gave the usual neurotropic reaction on intracerebral inoculation in mice, and also to virus in the liver which on subcutaneous inoculation into *rhesus* monkeys and subsequent reinoculation intracerebrally into mice, gave rise to typical viscerotropic reactions. It seems, therefore, that the virus is dissociated in the baboon, being strongly neurotropic in the brain and viscerotropic in the liver.

SALEUN (p. 550) reports that the neurotropic Dakar strain has been maintained in the laboratory for 4 years without undergoing any modification.

PENNA and MOUSSATCHÉ (p. 558) show that passage of a fully virulent virus of the Asibi strain in fowl embryos from which the nervous tissues had not been removed resulted in great reduction of neurotropic properties by the 49th passage. This is a much quicker modification than was found in the case of virus 17 D which was fully

neurotropic after 89 passages even though the nervous system had been removed from the embryos used for culture.

FINDLAY and MACCALLUM (p. 93) have demonstrated the power of the yellow fever virus to infect *rhesus* and other monkeys when administered by means of a catheter passed into the stomach. Pantropic and neurotropic strains were used, and also the tissue culture virus 17 D. All the monkeys used became infected, some dying and others showing immunity. The experiment failed with other animals and with 6 human volunteers, and this may be correlated with the rapid destruction of the virus by the acid gastric juice, which is known to occur *in vitro*. PELTIER *et al.* (p. 92) have shown that the neurotropic French strain of yellow fever virus passes to the blood of monkeys and man when applied to the scarified skin. They have therefore used this method in the vaccination of a number of men [see below, *vaccination*].

FINDLAY and MACCALLUM (p. 93) point out that 37 cases of yellow fever have been reported in laboratory workers in close contact with infective material [and presumably without the intervention of any vector]. They further report that two of their monkeys, kept in separate animal houses, died from spontaneous yellow fever. In these rooms there had not been any infected animal during the preceding 3 and 6 months respectively and no virulent pantropic virus was in the laboratory during the period. The method of infection is not known, mosquitoes were entirely absent, but monkey lice, rat fleas, the cockroach *Blattella germanica* and a small ant were present. The possibility that one or more of these arthropods was responsible is under consideration. [It is shown above that monkeys may be infected *per os*, and the same authors have proved that the virus can exist with full activity for 15 days in *B. germanica*. The possibility of infection through scarified skin is discussed by PELTIER *et al.* above and through the intact skin by ARAGÃO below.]

ARAGÃO (p. 556) advances the theory that the transmission of jungle yellow fever, which is commonly acquired during the daytime, depends mainly on the human skin coming into contact with infected mosquito faeces deposited on plants in the woods where the insects shelter. Jungle and other mosquitoes which bite during the day are said to be always young insects which have not yet sucked blood and which cannot, therefore, be infected with yellow fever. It is thought that jungle yellow fever must have originated from the adaptation of the urban virus to jungle mosquitoes in comparatively recent times. The jungle mosquitoes are adapted to lower temperatures than *Aëdes aegypti* and can transmit the disease at 20°C., whereas *Aëdes aegypti* requires 25°C. The development of the virus depends more however, on adaptation to the insect host than on the thermal level. In the opinion of HOFFMANN (p. 556), on the other hand, jungle yellow fever is the disease in its primal natural state in which it maintains itself in local mammalia.

O'BRIEN (p. 552) has given details of the larval index for different localities in the Gold Coast for 1938.

ATKEY (p. 552) found 125 specimens of *Aëdes aegypti* in over 5 million collections of mosquito larvae in the Sudan. In a survey of Mombasa, chiefly concerned with malaria, WISEMAN *et al.* (p. 786) found that the commonest mosquito was *Aëdes aegypti*, and that several other mosquitoes known to be capable of transmitting yellow fever were present. Monkeys which might act as reservoirs of infection

are found and the authors point out that, should yellow fever be introduced, this area would almost certainly become an endemic centre.

KENNEDY (p. 553) has investigated the visual responses of flying *Aëdes aegypti*. There is an attraction to moving objects and especially to dark moving objects, but the inability of the mosquito to fly except in gentle winds may be an important factor in confining this species to sheltered places.

WHITFIELD (p. 554) has discussed the importance of air transport in relation to malaria and yellow fever.

Pathology.

SICÉ and RODALLEC (p. 551) examined the foetuses of two women who died of yellow fever, neither having aborted. The majority of the foetal organs showed changes resembling those in the mothers and in the foetal livers were found fatty degeneration, dilatation of the sinusoids and much pigment, but no cellular necrobiosis.

In discussing the possibility that the pathological appearances in poisoning by carbon tetrachloride may resemble those seen in yellow fever, BABLET (p. 88) considers that this is unlikely in previously healthy subjects, but points out that in the colonies natives are rarely free from other infection and that diseased organs cannot withstand the action of toxic agents so well as healthy, and may develop lesions resembling those of yellow fever except that pyknotic nuclei are present. The most difficult cases to diagnose are those with recent cellular lesions superimposed on chronic hepatitis.

Control.

In the Gold Coast, MACKAY (p. 549) reports that the preventive measures, which are confined to the larger centres and ports, comprise careful mosquito control, with particular attention to trees, in the rot holes of which Aëdes breeds. Residential areas still provide the most important safeguard for Europeans, but the number of Africans living in these areas has increased recently.

POWERS and HEADLEE (p. 94) have experimented with oils to test their effect on the eggs of *Aëdes aegypti*. The lethal action appears to depend on the establishing of a coat of oil on the chorion, which leads to oxygen starvation and death. The more complete the coat the more rapidly is death produced. Twenty-eight oils were tested, the most efficient were those with viscosity of 108, of which the oil known as "Zerice 40," manufactured by the Standard Oil Company of New Jersey, was the best.

ATKEY (p. 554) gives details of the regulations enforced in the Sudan to prevent the spread of yellow fever by aircraft. In infected zones passengers are only allowed to embark at anti-amaryl aerodromes, must remain for 6 days under observation in the aerodrome before embarking, and must carry a certificate. Night stops are forbidden except at anti-amaryl aerodromes and passengers and crew must remain at the aerodrome in places free from mosquitoes. Intensive anti-Aëdes measures are undertaken in suspected regions. Anti-amaryl aerodromes must be at least 1 kilometre from human habitation. By these means there is no risk of infected Aëdes being carried in aircraft and the only possibility of spread is by infected persons during the incubation period. This risk would be reduced by a system of certificates for passengers and crews.

[It may here be noted that Rule 9 of the Indian Aircraft (Public Health) Rules, 1940, has been amended ; the relevant part now reads as follows :—

Special provisions relating to yellow fever.

9. An aircraft shall be regarded as infected with yellow fever— . . . . (iv) if there is on board any person who within nine days of arrival in India has been in a yellow fever infected area :

Provided that an aircraft shall not be regarded as infected under clause (iv)—

(*a*) if the person referred to has only alighted in a yellow fever infected area at a non-infected anti-amaryl aerodrome and is in possession of a certificate from the Health Officer of that aerodrome stating that during his stay he either remained within the anti-amaryl aerodrome, or, if he went outside it, he did so under such protected conditions as would make it impossible for him to be bitten by mosquitoes, or

(*b*) if the said person has been protected against the disease by a previous attack or by satisfactory inoculation performed not less than 21 days, and not more than two years, before his arrival in the yellow fever infected area.

(Clause (*b*) originally read :—

(*b*) if the said person has been protected against the disease by satisfactory inoculation within the preceding two years or by a previous attack of the disease.)]

Vaccination.

MACKAY (p. 549) advises that all Europeans should be vaccinated before proceeding to the Gold Coast, since most people must travel and the quarantine measures during an outbreak profoundly complicate travelling and trade.

The Yellow Fever Commission (p. 88) confirm the value of vaccination in general and recommend the use of virus vaccine 17 D. With this vaccine the amount of virus circulating in the blood is too small to infect mosquitoes fed on the vaccinated subjects. JAMES (p. 88) states that for jungle yellow fever the only practical method of protection appears to be vaccination, and that during 1938 over one million persons were vaccinated with the tissue culture virus 17 D. In London 7,000 have now been vaccinated before going abroad, some with 17 D, and no cases of delayed jaundice have been seen with the latter. Antibodies may persist for as much as 7 years, but usually disappear within 2 years. Revaccination has been performed without reaction. As time goes on it is becoming increasingly evident that vaccination affords a sure method of protection.

BRIERCLIFFE (p. 558) reports what must be an exceptional case, that of a woman who contracted yellow fever 4 months after vaccination. She recovered, but the protection afforded can only have been slight. Such cases have occurred, but rarely, in Brazil.

VOGEL and RIOU (p. 91) write of the value of phosphate vaccine (of which 3 injections are given) and of egg-coated vaccine (of which a single injection is given). With the former, immunity develops between the second and third inoculation in 85 to 90 per cent., and in 75 per cent. this persists from one to two years. In over 10,000 persons vaccinated only one case of yellow fever developed in French colonies, whereas there were 109 cases in unvaccinated persons.

SALEUN (p. 550) shows that the sera of certain Europeans in French Equatorial Africa, vaccinated with egg coated vaccine, gave little or no protection after 3 months, and concludes that the vaccine, received from Paris, had deteriorated during transport. Vaccine should therefore be prepared on the spot in the case of any serious outbreak.

JADIN and ARNALDI (p. 557) state that in the Congo Europeans show more reactions after vaccination than do the natives, and that there is a liability in Europeans to meningo-encephalitic reactions. Vaccination (which was with Laigret's egg-coated vaccine) should only be resorted to in Europeans in case of danger such as the outbreak of an epidemic.

PELTIER *et al.* (p. 92), having shown that neurotropic virus can pass through scarified skin, vaccinated a number of people with a mixture of neurotropic yellow fever virus and smallpox vaccine, with considerable success as far as yellow fever was concerned. The application of this method to large numbers of natives in Africa is being authorized. The same authors (p. 557) contribute further information on simultaneous vaccination against smallpox and yellow fever by the scarification method. In 98,873 vaccinations there were no serious after-effects, even in infants, and there were no cases of yellow fever due to transmission of the vaccine virus by *Aëdes aegypti*. Protection against smallpox was equal to that produced by the ordinary method, and protection against yellow fever was given in 95·6 per cent. of a large number of persons examined. The method is innocuous and rapid and appears to offer great possibilities for the protection of the general native population.

PENNA (p. 558) reports a new technique for the aseptic removal of fowl embryo from the egg, which eliminates the necessity for filtering the suspension of embryo in the preparation of vaccine.

Charles Wilcocks.

YELLOW FEVER.

PRÉCIS OF ABSTRACTS IN THIS SECTION.

CANTON (p. 65) shows that in Senegal during the last 150 years, epidemics of yellow fever have been followed by silent intervals of 7 to 37 years.

SMITH (p. 66) has found yellow fever immune bodies in the sera of 32 per cent. of sheep in Kano, N. Nigeria. Intracerebral inoculation of yellow fever virus into sheep causes the production of immune bodies and appears to retard the action of the virus when this is inoculated into mice. The virus survives for at least 13 days in the sheep's brain. The immune bodies found in sheep in Kenya and Nigeria are probably the result of acquired immunity, but the possibility of diseases other than yellow fever producing them has not yet been definitely excluded.

SICÉ and BROCHEN (p. 66) record isolated cases of yellow fever in the jungle country of the French Sudan, and consider that animal reservoirs may exist.

DA FONSECA (p. 66) in Brazil infected the monkey *Alouatta fusca* with yellow fever virus and found that the virus could be recovered

from its blood on the 8th and 14th days, but not on the 3rd. The animal died on the 15th day but the virus could not be isolated from the liver, brain, kidney or spleen. No symptoms of yellow fever could be observed during life or at autopsy. With ARTIGAS (p. 67) he has tested the susceptibility of monkeys of the species *Cebus cirrifer*, to the same strain of virus. None of the animals died but some showed pyrexia depending largely on the route of infection. The virus could be isolated on the 4th but not on the 9th day.

SNEATH (p. 67) has obtained 27 per cent. of positive protection tests with human sera from parts of British Guiana and concludes, from this and previous work, that yellow fever is endemic in the hinterland and that certain areas have more important foci of disease than others.

FINDLAY and MACCALLUM (p. 68) attempted, unsuccessfully, to cultivate the virus in media in which living cells were not included, but succeeded when living cells of various kinds were added. They suggest that viruses have no enzymes of their own but are forced to borrow enzyme systems from the living cells they parasitize, in order to build up their own specific substance. They (p. 68) show that by bubbling oxygen through culture medium, larger amounts can be used than was possible before, and that there is thus a saving of labour in the growth of large quantities of yellow fever virus. There is no change in pathogenicity by this method.

FOX and GARD (p. 69) show that when dried virus is kept at 4°C. in air having a moisture content of over 4 to 5 per cent., virulence is soon lost. With less moisture virulence is retained. Preservation in nitrogen results in retention of virulence for a longer period than preservation in air, and these results suggest that inactivation of the virus is in part a process of oxidation. Virus should therefore be preserved in an atmosphere containing less than 4 per cent. residual moisture, and either in nitrogen or in a vacuum.

PICKELS and BAUER (p. 69) calculate the size of the particles of yellow fever virus as between 12 and 19$\mu\mu$.

LEVAN (p. 70) discusses measures taken against *Aëdes aegypti* in Florida. Gambusia may be used successfully. Eggs of Aëdes were found to be viable one year after having been laid in wooden egg troughs.

SMITH *et al.* (p. 70) report that almost 90 per cent. of a large number of persons vaccinated with virus 17 D showed immunity for periods up to 2 years. *C. W.*

CANTON. La fièvre jaune dans la circonscription de Dakar et dépendances. [**Yellow Fever in the Neighbourhood of Dakar and its Dependencies.**]—*Arch. Méd. et Pharm. Nav.* 1939. July–Aug.–Sept. Vol. 129. No. 3. pp. 387–410. With 2 figs. [18 refs.]

A general account of the subject including a summary in tabular form of previous epidemics of the disease in Senegal during the past 150 years, showing that epidemics are followed by silent intervals or latent periods of 7 to 37 years. The organization of the Public Health service at Dakar is described and finally methods of vaccination, especially the mixed vaccination against variola and yellow fever. [This is described somewhat grandiloquently as yet another magnificent and generous gift of French Science to the Tropics.] *E. Hindle.*

SMITH (E. C.). **Yellow Fever Immune Bodies in Sheep Sera.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1940. June 27. Vol. 34. No. 1. pp. 97–104.

The author examined the sera of 100 sheep from Kano, Northern Nigeria, used at the Medical Research Institute, Lagos, during 1939, by means of the mouse protection test for yellow fever and found that 32 gave a positive reaction.

Sheep were then inoculated intracerebrally with a suspension of neurotropic yellow fever virus, lethal for mice in 3 days. After 3 successive passages in sheep, some animals showed symptoms similar to those caused by rabies virus, ending in general paralysis. Further passages in sheep were successful and later the virus was transferred back to mice by using as inoculum a 1 in 10 suspension of sheep's brain in saline. The virus was found to survive for at least 13 days in the brain tissue of sheep, and after such passage its action in mice was retarded for one or more transfers, the interval between inoculation and death being increased to about 5 instead of 3 days. Although two of the sheep succumbed after intracerebral inoculation, it is not quite certain that they died as a result of infection with yellow fever virus, since no characteristic histological lesions were found.

Both intracerebral and subcutaneous inoculations of the virus were followed by the development of yellow fever immune bodies as shown by mouse protection tests.

It seems reasonable to assume that the yellow fever immune bodies in the sera of sheep in both Kenya and Nigeria develop as the result of an acquired and not a natural immunity, but the possibility of diseases other than yellow fever producing them has not yet been definitely excluded. *E. H.*

SICÉ (A.) & BROCHEN (L.). Les manifestations sporadiques du typhus amaril au Soudan français et leur expression épidémiologique. [**Sporadic Manifestations of Yellow Fever in the French Sudan and their Epidemiological Expression.**]—*Bull. Soc. Path. Exot.* 1940. Apr. 10. Vol. 33. No. 4. pp. 266–271. With 1 chart.

A description of 3 fatal cases of yellow fever, two European and one Syrian, occurring in the French Sudan during 1938, accompanied by an epidemiological study of each case.

These are not the first to be recorded from this region, for two years previously one of the officials working in the bush died of yellow fever, and 2 other Europeans who had transported this patient became infected but recovered.

These various isolated cases occurring in the jungle support the view that not only the native population may serve as a reservoir of infection, but also some of the wild animals, and as there is a restricted fauna in the French Sudan it should not be difficult to determine this host.

E. H.

DA FONSECA (Flavio). Comportamento do bugio *Alouatta fusca* Humboldt inoculado com virus amarilico Asibi. [**The Results of Inoculating *Alouatta fusca* with Yellow Fever Virus.**]—*Mem. Inst. Butantan.* 1939. Vol. 13. pp. 363–366. [English version pp. 367–370. With 1 fig.]

As long ago as 1914 BALFOUR suggested that the red howler monkey might be a reservoir of the yellow fever virus [this *Bulletin*, 1914,

Vol. 4, p. 154], having noted that deaths among them preceded an outbreak of human cases. ARAGÃO about a quarter of a century later (in 1938) repeated this observation adding that mortality among the monkeys preceded the human outbreak by about 20 days.

The author has carried out experimental work, inoculating *Alouatta fusca* with the Asibi virus from an infected *rhesus*. The former was bled three days after inoculation and four Swiss mice received each 0·03 cc. of blood intracerebrally, without effect. It was thought that three days had been insufficient for the virus to develop. More mice were inoculated with blood on the eighth day; this time the result was positive, and the virus re-isolated. The result was again positive fourteen days after the primary inoculation; the monkey died on the following day but the virus could not be isolated from liver, brain, kidney or spleen. No *symptoms* of yellow fever were observed during life or at autopsy, although the virus was in the blood from the eighth to the fourteenth day after inoculation. *H. H. S.*

DA FONSECA (Flavio) & ARTIGAS (Paulo). Inquerito sobre a sensibilidade de *Cebus cirrifer* ao virus amarilico. [**Susceptibility of *Cebus cirrifer* to the Yellow Fever Virus.**]—*Mem. Inst. Butantan.* 1939. Vol. 13. pp. 373–376. [English version pp. 377–380. With 1 fig.]

Several species of monkey have been tested for susceptibility to the virus of yellow fever: *Cebus macrocephalus* by DAVIS and SHANNON in 1929, *C. frontalis* by LLOYD and PENNA (1933), *Saimiri sciureus* by DAVIS (1930) and LLOYD and PENNA (1933), *Callithrix albicollis* by DAVIS (1930), *Ateles ater* by DAVIS (1931) and others.

Several cases of jungle yellow fever having been observed in 1936 in Botacatú, São Paulo, the authors decided to investigate the susceptibility of the local monkey, *Cebus cirrifer*. They used the Asibi strain preserved dry *in vacuo*. Some received the virus subcutaneously, others intracardially, intravenously, intracerebrally, or intraperitoneally. Those inoculated by either of the first two showed rise of temperature to below 40°C. during the first three days, 40°–40·5°C. on the fourth and fifth days and ranging between 39·9° and 41°C. till the twentieth day. None of the animals succumbed and the virus could be isolated on the fourth day but not when attempts were made on the ninth day. Two of the monkeys inoculated intraperitoneally and one intravenously responded with rise of temperature up to 40·5° and 40·3°C. respectively, but attempts to re-isolate the virus from these were unsuccessful. *H. H. S.*

SNEATH (P. A. T.). **Yellow Fever in British Guiana. Further Observations.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1940. June 27. Vol. 34. No. 1. pp. 91–96.

An addition to the author's previous observations on the yellow fever problem in British Guiana. [See this *Bulletin*, 1940, Vol. 37, p. 90.]

A further 217 specimens of sera, including some from younger age groups in nine previously designated areas, have been examined by means of mouse protection tests, and 59 sera (27 per cent.) contained immune bodies against yellow fever. In addition a further 10 per cent. gave inconclusive results. These results confirm the view that certain

areas of the Colony have greater importance as foci of the disease than others, and the inclusion of representatives from younger age groups makes it clear that yellow fever is endemic in the hinterland of British Guiana. *E. H.*

FINDLAY (G. M.) & MACCALLUM (F. O.). **Experiments on the Growth in Vitro of the Virus of Yellow Fever.**—*Brit. Jl. Experim. Path.* 1940. Aug. Vol. 21. No. 4. pp. 173–180.

An account of results obtained in the course of experiments on the conditions necessary for the growth *in vitro* of yellow fever virus, with the ultimate object of finding a medium in which the virus will grow in the absence of living cells.

The strain of yellow fever virus generally used was the attenuated viscerotropic virus 17 D between the 200th and 250th passage. Prolonged growth of this virus took place in a serum Tyrode medium containing a high concentration of fowl or mouse embryonic tissue without any detectable increase in the neurotropism of the virus. When, in place of embryonic tissue, adult mouse brain tissue was added to the medium no growth was obtained. Attempts to replace embryonic tissues by the minced tissues of larval *Aëdes aegypti* were also negative. On the other hand the virus grew readily in serum Tyrode medium containing human placental tissues, or mouse carcinoma or sarcoma tissues.

Fowl embryo cells heated for 30 minutes at 56°C. failed to support the growth of virus.

The virus also failed to grow in serum Tyrode medium, in the absence of animal cells, to which the following had been added :—(*a*) An extract of trypsinized embryonic cells ; (*b*) an extract of embryonic cells exposed to ultra-violet light ; (*c*) a complete amino-acid mixture ; (*d*) a complete amino-acid mixture with the addition of either thiamine or nicotinic acid or both ; (*e*) living yeast cells or living *Bact. coli* ; (*f*) minced Seitz EK filter pads.

The virus grew in a Tyrode medium with embryonic cells in the absence of serum, and in a Tyrode serum medium with embryonic cells when either the Tyrode solution contained no glucose, or the glucose was replaced by either maltose or lactose. It also grew readily with embryonic cells in a Tyrode medium containing neither glucose nor serum, *i.e.* a fluid medium containing only inorganic salts.

It seems probable that the function of the living cell is not merely to provide a physical basis for the multiplication of the virus, and the authors suggest that possibly viruses possess few or no enzymes of their own and are forced to borrow enzyme systems from the living cells they parasitize in order to build up their own specific substance.

E. H.

FINDLAY (G. M.) & MACCALLUM (F. O.). **Culture of Yellow Fever Virus in Vitro.**—*Lancet.* 1940. Aug. 10. pp. 163–164.

The authors give details of a modification of the usual method of growing yellow fever virus *in vitro*.

The passage of 8 to 10 bubbles of oxygen per minute through the culture media permits the use of at least 30 cc. of the medium instead of the usual 5 cc. and thus reduces the amount of labour involved in the growth of large quantities of the virus.

Twenty-four subcultures of virus 17 D have been made with this method, and no change has been noted in its pathogenicity for mice; moreover the titre of the virus has been equal and in some cases superior to that obtained by the ordinary culture in flasks. This method has also been applied successfully to the viruses of vaccinia and lymphogranuloma inguinale, so it is probable that other viruses, and possibly Rickettsiae, may be grown under the same conditions.

E. H.

Fox (John P.) & Gard (Sven). **The Preservation of Yellow Fever Virus.**—*Amer. Jl. Trop. Med.* 1940. May. Vol. 20. No. 3. pp. 447–451. With 2 figs. [11 refs.]

The duration of activity of dried yellow fever virus sealed in air was found to be almost directly proportional to its residual moisture content. [This is the contention of the authors, but the findings indicate that it was *inversely* proportional.]

Samples of dried vaccine virus were kept in air at 37·5°C. and tested for virus activity by intracerebral inoculations into mice, and the moisture content determined by the loss of weight after 6 hours at 110°C. An almost linear relation was found between the two factors, with less than one day's duration of activity for samples containing more than 6 per cent. moisture. Similar virus samples stored in air at 4°C. for periods up to a year were also tested and showed that when the moisture content was above the critical level of between 4 and 5 per cent. the virulence was soon lost, but that below this figure it was retained.

In one experiment samples of the same lot of virus were sealed either in air or in nitrogen and kept at 4°C. After 3 weeks at 4°C. the sample in air had a titre of 1 : 75 and that in nitrogen 1 : 700. Suspensions of virus exposed to air at room temperature became non-virulent within 24 hours, whilst similar suspensions kept under vaseline after nitrogen had been bubbled through the fluid, were virulent from 5 to 7 days later.

These results suggest that the inactivation of yellow fever virus is, at least in part, the result of an oxidation reaction, which in dried virus bears a direct relation to the amount of residual moisture. It is evident that if samples are to be stored for up to a year the residual moisture should not exceed 4 per cent. and if the material is sealed in a nitrogen atmosphere, or in a vacuum, the keeping qualities will be improved.

The only preparations found to contain less than 4 per cent. residual moisture were dried either in the Mudd-Flosdorf type of apparatus at room temperature, or at −18°C. in a large desiccator containing phosphorus pentoxide and continuously evacuated through a cold trap for at least 48 hours.

E. H.

Pickels (Edward G.) & Bauer (Johannes H.). **Ultracentrifugation Studies of Yellow Fever Virus.**—*Jl. Experim. Med.* 1940. May 1. Vol. 71. No. 5. pp. 703–717. With 7 figs. [18 refs.]

A study of the behaviour of yellow fever virus particles in the unaltered serum from infected monkeys.

The virus was found to show a very high light absorption at wavelengths 320 to 440 μ, and in a 1 cm. thickness of fluid the small amount

of virus present absorbed about as much light (approximately 25 per cent.) as all the normal serum proteins, which had a combined concentration some 1,000 times as great. The concentration of virus in the unaltered serum was found to be about 0·00005 gm. per cc., therefore a minimal infective dose for monkeys of 1 cc. of a 10^{-9} dilution would contain approximately 10,000 virus particles. It is likely, however, that many of these particles are inactive as a result of the action of antibodies in the serum.

Infective serum with a viscosity of 14 millipoises sedimented virus particles at rates lying between 18 and 30×10^{-13} cm./sec./dyne. There is evidence that this spread is the result of aggregation or association phenomena.

Computations of the size of the particles from these results agree in general with those made from ultrafiltration studies. Assuming that the density of yellow fever virus particles approximates to that of protein, the volume is computed to be at least that of a spherical particle with a diameter of 12μμ, but a density of 1·15 gm. per cc. would give a diameter of 19μμ. *E. H.*

LeVan (James H.). **Measures instituted for the Control of** *Aëdes aegypti.—Amer. Jl. Public Health.* 1940. June. Vol. 30. No. 6. pp. 595–599. With 4 figs.

An account of measures used for the control of *Aëdes aegypti* with special reference to Florida. It is emphasized that control is accomplished only by repeated painstaking inspections from house to house to find and to eliminate *all* artificial containers that may serve as breeding places. *Gambusia holbrooki* was used successfully in Key West to control the breeding of Aëdes in dark covered drinking-water cisterns. Before being placed in the cisterns the fish were kept overnight in chlorinated water containing doses of hypochlorite sufficient to produce a chlorine residue of 0·1 to 0·15 p.p.m.

Houses containing large numbers of adult mosquitoes were disinsecticized by spraying with a concentrated pyrethrum extract in oil. Among breeding places for Aëdes may be mentioned piles of old automobile tyres, controlled by spraying with Paris green, and cemetery flower vases controlled by placing pellets of Paris green in each vase.

Eggs of *Aëdes aegypti* laid in wooden egg troughs in the vicinity of Miami were still viable one year later, adults being reared from them.

E. H.

LeVan (J. H.). **Viability of** *Aëdes aegypti* **Eggs.**—*Public Health Rep.* 1940. May 17. Vol. 55. No. 20. p. 900.

"This experiment disclosed that it is possible for *Aëdes aegypti* mosquito eggs to remain viable in the vicinity of Miami, Fla., for at least one year. No freezing weather occurred during the experimental period."

Smith (Hugh H.), Roca García (Manuel), Gast Galvis (Augusto) & Calderón Cuervo (Héctor). Vacunación contra la fiebre amarilla en Colombia. [**Vaccination against Yellow Fever in Colombia.**]—Reprinted from *Rev. Facul. de Méd.* Bogotá. 1940. July. Vol. 9. No. 1. 24 pp. With 1 map & 1 fig. [19 refs.]

In the period of nearly three years, from June 1937 to April 1940, there have been 175,496 persons in Colombia vaccinated against yellow

fever, the virus used being 17 D. Of these, 2,139 have been tested and nearly 90 per cent. have been found immune up to two years after. *H. H. S.*

SOPER (Fred L.). Progressos realizados nos estudos e combate da febre amarela entrea IX e a X Conferencias Sanitarias Panamericanas 1934–1938. [**Advances in the Knowledge of Yellow Fever between 1934 and 1938.**]—*Arquivos de Higiene.* Rio de Janeiro. 1939. Feb. Vol. 9. No. 1. pp. 65–86. With 1 chart. [22 refs.] English summary.

TRYPANOSOMIASIS.

PRÉCIS OF ABSTRACTS IN THIS SECTION.

LAMBORN (p. 72) reports the results of a sleeping sickness survey in Nyasaland. The problem of concealment of cases may be important, but since most of the population is concentrated along the coast and near the rivers, where conditions suitable for agriculture exist, the occurrence of major outbreaks is unlikely. Minor epidemics may occur in that part of the population which lives in fly areas, since villages are small and the resistance of the people is undermined by lack of protein in the diet. He suggests that vaccinators and dispensers should be instructed to send more blood films for examination, that clearings of bush and removal of population should be carried out, and that game should not be protected since it is a probable reservoir of *T. rhodesiense.*

BAX (p. 73) has reported on the work of the Department of Tsetse Research, Tanganyika Territory, for the years 1935–1938.

JACKSON (p. 74) discusses methods of analysis of populations of *Glossina morsitans.* ZUMPT (p. 74) discusses the distribution of subspecies of *G. palpalis* in the Belgian Congo.

HARDING (p. 75) found that the feeding of *Glossina tachinoides* containing developing *T. brucei* on human blood did not produce any increase of resistance to normal human serum in the trypanosomes subsequently transmitted to a guineapig by the bites of the fly.

MCLETCHIE (p. 76) gives the (low) infection rates found in man in two districts in Nigeria which had not previously been examined. A number of the patients were treated with 4:4′-diamidino stilbene; in cases with no marked involvement of the nervous system this drug appears to be as effective as Bayer 205, but less effective than the combination of Bayer 205 and tryparsamide, in the doses described. HARDING (p. 77) obtained cure or improvement with 4 : 4′-diamidino stilbene in 4 mild or moderately severe sleeping sickness cases in N. Nigeria, but in 9 moderate or severe cases no improvement was effected. In the majority of cases in this area the cerebrospinal fluid is pathological and the disease is severe, so that the conditions of the test of the drug were not so favourable as may be the case in other areas.

HAWKING (p. 78) has made chemical estimations of the concentration of Bayer 205 in the blood of three sleeping sickness patients who relapsed during or shortly after a course of treatment. The concentrations were less than in other patients and the author concludes that this defective accumulation was one of the main factors responsible for the relapses.

Ross (p. 78) has compared the toxicity of tryparsamide and neocryl in the treatment of neurosyphilis. Neocryl is not inferior to tryparsamide as a therapeutic agent and is much less toxic, especially to the optic nerve.

Oag (p. 80) reports attempts to infect chick embryos with *T. brucei* and other trypanosomes.

Chagas's Disease.—Gašić Livacić and Chait (p. 80) report 11 further cases of Chagas's disease in Chile. Diagnosis was made by thick blood film examination, the Machado reaction or by xenodiagnostic methods.

Mazzotti (p. 81) records the results of inoculating mice with material containing *T. cruzi*. Kolodny (p. 81) shows that an environmental temperature lowered to 40°–45°F. transforms an ordinary mild infection with *T. cruzi* in young rats into an exceedingly acute and fatal disease.

Packchanian (p. 81) found infection with *T. cruzi* in 65 per cent. of *Triatoma heidemanni* collected in Texas. *T. sanguisuga ambigua*, which is widely distributed in Florida, is capable of conveying infection with *T. cruzi*, but has not been found infected in nature. Gasić Livacić (p. 82) discusses the infection rates of Triatomidae in part of Chile, and in conjunction with Bertin (p. 82) gives a list of the animal reservoirs of *T. cruzi* in that country.

Dussert *et al.* (p. 83) discuss the Machado reaction, which is of particular value in chronic forms of the disease. In suspected cases positive reactions were obtained in some persons in whom the diagnosis was later confirmed, and in others who had lived in heavily infested districts, but no positive results were found in healthy persons who lived in districts known to be free from infection. The preparation of the antigen is described. *C. W.*

Lamborn (W. A.). **Survey for Sleeping Sickness.**—*Nyasaland Protectorate Ann. Med. & San. Rep. for Year ending 31st December, 1939.* Section VIII. pp. 26–27.

At the suggestion of the Director of Medical Services, it was decided to make a full examination of every man, woman and child living within 5 miles of any village or area in which cases of sleeping sickness had occurred during the last five years.

Lamborn was responsible for this work in the region south of the Kota Kota-Kasungu road, which roughly comprises the southern half of the district. He examined the blood of 2,851 persons by the thick film method without finding a single infection. He states that he is confident he examined practically the whole of the population concerned. Notwithstanding Lamborn's failure to find any cases, one came to light shortly after his departure. This naturally raised the question as to what extent other cases may have remained undiscovered. Concealment was the main difficulty experienced in coping with the epidemic in the vicinity of Domira Bay from 1911 onwards, and this may well have been responsible for the present instance.

In view of his study of the topographical distribution of *Glossina* in relation to population, Lamborn considers that any major outbreak of sleeping sickness would be extremely unlikely. As a result of the poverty of the soil over most of the area, the population is concentrated along the coast, where conditions suitable for the cultivation of the staple foods exist, and in the broad, open stretches bordering the

rivers in the south where the cultivation of maize and other cereals, as well as that of cotton, is carried out on a large scale. These are not the normal habitats of the fly ; but as concerns the population actually living within the fly area, in which there are but few patches of land of agricultural value, the position is very different, for there exist the factors which might well lead to a minor epidemic. The villages are all small, their clearings against the fly are ineffective, the gardens are at a distance from the villages, and the chances of infection are still further increased by the abundance of game animals, from which it would seem that the tsetse have been deriving the infective strain of trypanosome. Moreover, the resistance of these people may well have been lowered by their lack of a balanced diet, as they get little nitrogenous food.

The author's recommendations are as follows :

" (*a*) that concealment of cases might be counteracted by making it the duty of vaccinators to take blood films of all sick persons encountered for examination by the medical officer.

" (*b*) that dispensers also might be instructed to submit to the medical officer films taken from all persons showing a temperature.

" (*c*) that all small villages in the fly areas should be eliminated and should be settled together to form larger communities the activities of which in the way of clearings, etc., would have some real effect in dispelling the fly.

" (*d*) that the removal of villages from one site to another should not be permitted without authorization of the District Commissioner who should first satisfy himself that the site selected was outside the fly zone.

" (*e*) that indirect attack on the fly might be carried out through measures directed against the game. The operation of the Game Laws, 1911, being suspended over the southern part of the district (a game reserve existing in the north of it).

"As an additional need for the control of game it seemed to me that in that particular region game rather than man must be serving as the reservoir of the infecting organisms for the occurrence of cases in villages that are not within the fly area, all of which were isolated ones, seemed to preclude the possibility of there having been man to man infections. But the incidence of such cases over a long period of time and over a wide area is readily explicable if one assumes that *T. rhodesiense* has here become a parasite of wild animals, in which as Corson has recently shown, it may retain its infectivity to man for several years and perhaps indefinitely.

" (*f*) I suggested, further, that the question of rectifying the southern boundary of the game reserve might well be considered for it is traversed by the main road leading from Kota Kota to the west whereby it has become highly probable that flies are conveyed into the settlement by cars or on the backs of natives. The boundary should have been, in my view, to the north of this road." *W. Yorke.*

TANGANYIKA TERRITORY. DEPARTMENT OF TSETSE RESEARCH. **Tsetse Research Report 1935–1938** [BAX (S. Napier), Assistant Director]. —88 pp. With 2 maps, 6 figs. & 2 plates. 1940. Dar es Salaam : Govt. Printer. [5s.]

This report covers a period of four years, with special stress on the last year, 1938. These four years have been momentous in the history of the Department. The first three were employed in the successful application on a comparatively small scale of methods which have been evolved in earlier years to destroy one of the most important species of tsetse, *G. swynnertoni*, in the development of

new methods, and lastly, in further important fundamental research in the bionomics of some of the chief species.

The report deals in turn with the various species of Glossina found in Tanganyika, *viz.*, *G. morsitans*, *G. pallidipes*, *G. fuscipes*, *G. brevipalpis* and *G. austeni*. The general distribution in Tanganyika of each species is stated, and experiments devised with the object of controlling the various species are described.

The next portion of the report deals with laboratory work.

No attempt is made by the author to summarize the conclusions to be drawn from the mass of work recorded in this report, and it appears almost impossible to deal with the matter adequately in a summary of reasonable length. Those interested must therefore consult the report in the original. *W. Y.*

JACKSON (C. H. N.). **The Analysis of an Animal Population.**—*Jl. Animal Ecology.* London. 1939. Vol. 8. No. 2. pp. 238–246. With 1 graph. [Summarized in *Rev. Applied Entom.* Ser. B. 1940. Aug. Vol. 28. Pt. 8. p. 140.]

"The principle on which is based the author's estimation of a population of *Glossina morsitans*, Westw., in a given area is that if flies are marked and released on a certain date, the proportion of marked individuals found in a random collection of flies on a subsequent date should be the same as the proportion of marked flies released to the total population on the date of release. This would hold good if the ratio of marked to unmarked individuals were not altered because some flies die or leave the area and others emerge or enter it. It is the purpose of this paper to describe modifications of the method that take into account rates of emergence, death and dispersal. In the first modification, flies marked on a certain date are recaptured at regular intervals and the rate of decrease in the proportion of marked flies recaptured is noted. Using this rate of decrease, it is possible to calculate, by methods described, what proportion of the population the marked flies represented on the day they were marked. In the alternative modification, which is the converse of the first and may be used as a control for it, the calculation is based on the numbers, in a single collection of flies, of individuals that had been differentially marked at regular intervals previously."

ZUMPT (F.). Die Verbreitung der Glossina palpalis-Subspezies im Belgischen Kongogebiet. [**The Distribution of the Subspecies of *Glossina palpalis* in the Belgian Congo.**]—*Rev. Zool. Bot. Afr.* Brussels. 1940. Vol. 33. No. 2. pp. 136–149. With 1 plate & 3 figs. [Summarized in *Rev. Applied Entom.* Ser. B. 1940. Aug. Vol. 28. Pt. 8. pp. 140–141.]

"The receipt from the Congo Museum at Tervueren of almost 2,300 examples of *Glossina palpalis*, R.-D., from different parts of the Belgian Congo has led the author to confirm the validity of the three subspecies erected by him and to dispute the conclusions of PATTON. The Congo region is particularly appropriate for investigations on this species, since all three subspecies occur there, together with intermediate forms. The author considers the terminology used by HENNIG (1936) in a paper on the genitalia of the cyclorrhaphous Diptera to be more satisfactory than that used by himself or by

PATTON and has, therefore, adopted it. He describes the chitinous parts of the genitalia of the genus *Glossina* to explain the use of these terms.

"He discusses the relative merits of the distinguishing characters and the methods of examination of specimens used by himself and PATTON. He points out that, although the form of *G. palpalis* from which the species was described is unknown, it was more probably the form that occurs in the region at the mouth of the Congo than that found inland, and he, therefore, gives the name *G. palpalis palpalis* to the former, which was called var. *wellmani*, Aust., by PATTON and considers that PATTON's type form is *G. p. fuscipes*, Newst., and his var. *fuscipes*, a mixture of *G. p. fuscipes* and *G. p. martinii*, Zumpt. The synonymy of the three subspecies is shown in a list.

"The identifiable localities in the Belgian Congo from which are recorded the three subspecies and the intermediate forms found in the material studied are given in lists and shown on a map. The subspecies *palpalis* is found only in the region round the mouth of the Congo, as far east as Thysville. At Lundu and Lemba there are forms intermediate between *palpalis* and *fuscipes*. Subspecies *fuscipes* is the most widely distributed; it is present in its typical form in the immense rain-forest region between the Kassai-Sankuru, Congo and Ubangi rivers and extends eastwards as far as the Rift Valley north of Lake Kivu. The region south of the Sankuru is also part of the *fuscipes* area, but here preponderate atypical forms that have genitalia more or less resembling those of subspecies *martinii*. In the western part of this area typical *fuscipes* is also found, but the preponderance of atypical forms increases progressively to the east; these eventually give place to typical *martinii*. In the region of the headwaters of the Sankuru and Lomami rivers, forms intermediate between *fuscipes* and *martinii* occur. Subspecies *martinii* is found in the Rift Valley south of Lake Kivu and in an area extending westwards to the headwaters of the Sankuru River. In the western part of this area are found females with genitalia resembling *fuscipes* although those of the males resemble *martinii*."

HARDING (R. D.). **The Effect of a Diet of Human Blood on** *Trypanosoma brucei* **developing in** *Glossina tachinoides*.—*Ann. Trop. Med. & Parasit.* 1940. Sept. 26. Vol. 34. No. 2. pp. 97–99.

The majority of workers believe that the trypanosomes of man must in some way and at some time have been derived from *Trypanosoma brucei*, but up to the present no one has succeeded in demonstrating how this step might have occurred. The experiments described in the present paper show an attempt to throw light on this problem.

Pupae of *G. tachinoides* were collected and hatched in the laboratory, and a strain of *T. brucei* was obtained in guineapigs. This strain was found to have a fairly high virulence for guineapigs; it had a high resistance to reduced tryparsamide *in vitro*, concentrations of about 1 in 1,000,000 being necessary to kill all the organisms in a suspension within 24 hours at 37°C. The strain was sensitive to human serum in that all trypanosomes disappeared in pure human serum within about six hours.

It was found that the feeding of *G. tachinoides* containing developing *T. brucei* on human blood did not produce any increase of resistance to normal human serum in the trypanosomes subsequently transmitted to a guineapig by the bites of the fly. *W. Y.*

McLETCHIE (J. L.). **The Treatment of Early Cases of Nigerian Trypanosomiasis with 4 : 4′-Diamidino Stilbene.**—*Ann. Trop. Med. & Parasit.* 1940. Sept. 26. Vol. 34. No. 2. pp. 73–82.

This paper records the results of treating with diamidino stilbene a number of comparatively early cases of sleeping sickness in the Dass and Toro districts of Northern Nigeria. The mass surveys gave the following results: Dass, 14,615 persons examined and 196 (1·34 per cent.) cases of sleeping sickness found; Toro, 25,099 examined and 298 (1·15 per cent.) cases found.

Groups of patients from two villages were treated. From Bagel village, in Dass district, 8 cases were chosen. All had marked enlargement of the cervical glands; three denied symptoms; a fourth had pain in the neck-glands; and the remaining four gave a history of recurrent attacks of headache or fever. None showed wasting.

In all cases lumbar puncture was performed; the cell count varied from 2 to 9, and in six there was an excess of globulin. Treatment was given on the 1st, 3rd, 5th, 7th, 8th and 9th days. Diamidino stilbene was injected intravenously, except on the 5th day, when intramuscular injections were given to all except two cases. The dose varied from 0·7 to 2·2 mgm. per kilo. The results are set out in a table, showing the condition before treatment, and at three weeks and six months, respectively, after treatment. All the cases apparently did well. The excess of protein in the cerebrospinal fluid disappeared, and the fluid returned to normal. One patient died, after aborting, four months after completion of treatment.

The six patients from Laro village in Toro district were in a more advanced condition. Glandular enlargements were less marked, all gave a history of recurrent attacks of fever at frequent intervals, and all but one had lost strength. Lumbar puncture was permitted in three cases only; the cell count in these cases was 9, 17 and 196 cells per cmm., respectively. In two cases the protein was normal, but in the case with the heavy cell count there was a considerable excess. This patient died nine months after completion of treatment. The remaining five patients were examined six months after treatment; all insisted that symptoms had not returned, but only one looked really well, and one other looked better than before treatment. Both had gained weight. The remainder appeared much as before treatment, despite the apparent absence of symptoms; in none of them were trypanosomes found. In the two cases in which lumbar puncture had been performed before treatment the cerebrospinal fluid was again examined; the cell count had fallen to 5 and 6 respectively, and there was still no excess of globulin in either.

The following summary is given:—

"The findings of mass surveys for trypanosomiasis in two previously unexamined districts of the Bauchi Province of Northern Nigeria are given. Infection-rates were low.

"Fourteen cases of sleeping sickness were treated with diamidino stilbene. The first group of eight cases were of a mild nature: they received an average of 8·8 mgm. per kilo. of the drug; after six months, seven were in good health; one had died following an abortion. The second group of six showed a more advanced condition: they showed reaction to intravenous injection of the drug and received an average of only 6·3 mgm. per kilo.; they appeared to improve during treatment; one died nine days after treatment; after six months, only two were really well, though symptoms appeared to be absent in all five.

"Nine cases of a severity intermediate between the first two groups had Bayer 205 alone. After seven months, symptoms were in abeyance, but improvement in general condition was not marked.

"Seven mild cases from the same village as the first group had Bayer 205 and tryparsamide. After five months they were well, showing more improvement in general condition than did any of the other groups.

"Trypanosomes disappeared from the gland-juice after one to three injections of diamidino stilbene. Sclerosis of glands was much the same in all groups, and gland-juice was sterile at the last re-examination in all cases.

"Cases were too few, and the original changes in the cerebrospinal fluid too slight, for alterations as the result of treatment to be of much significance. After treatment with diamidino stilbene, no case showed increase in the cell count or in the globulin content of the cerebrospinal fluid beyond that found initially, and four fluids, previously abnormal in some respect, had become normal. With the other drugs, slight increases either in cell count or in globulin content followed treatment in some cases, and no specimen became strictly normal.

"The toxic effect of the drug is described. This is slight. Reaction occurs during intravenous injection, usually decreases in a few minutes and does not last more than 20 minutes. Care is required in the preparation and injection of the solution. The dosage given is subject to the reaction produced in the individual, but most patients can stand from 1 mgm. to 1·5 mgm. per kilo., and some 2 mgm. per kilo.

"In cases with no marked involvement of the nervous system, diamidino stilbene appears to be as effective as Bayer 205, but less effective than the combination of Bayer 205 and tryparsamide, in the doses described. The shorter course, eight to nine days, or even less, is a great advantage, but courses of, say, ten injections are probably advisable for routine treatment." *W. Y.*

HARDING (R. D.). **A Trial with 4 : 4′-Diamidino Stilbene in the Treatment of Sleeping Sickness at Gadau, Northern Nigeria.**—*Ann. Trop. Med. & Parasit.* 1940. Sept. 26. Vol. 34. No. 2. pp. 101–105.

The author has tested diamidino stilbene in the treatment of a number of sleeping sickness cases at Gadau in Northern Nigeria. He states that as sleeping sickness differs so widely in its manifestations in different parts of Northern Nigeria, it is of the greatest importance when attempting to estimate the value of a new preparation to have a clear knowledge of the type of disease to be treated and also of its reaction to drugs already proved. The author, therefore, gives a brief account of the disease as it is found at Gadau.

Among 100 unselected cases coming for treatment during 1939, enlarged cervical glands were found in only 71, of which 62 showed trypanosomes. Blood films were positive in only 22, but no less than 94 had a pathological spinal fluid. The majority of the patients suffered from nervous lesions, *e.g.*, marked somnolence, mental changes, tremor or ataxia, and in at least 28 per cent. the disease manifested itself chiefly in the guise of a pituitary-thyroid syndrome, as evidenced by adiposity, myxoedema, and other signs. Severe itching was a troublesome complaint amongst most of the advanced cases. Evidence was obtained that, once the nervous system becomes definitely involved, the natural course of the disease is rapid.

The conclusions are as follows :—

"Of 13 sleeping sickness cases treated at Gadau during 1939 with diamidino stilbene, three mild or moderately severe cases were clinically

cured and one improved, though in no case did the C.S.F., when initially pathological, return to normal. Of the remaining nine moderate or severe cases, one was clinically unchanged and eight were definitely worse, while all showed greater disturbance of the C.S.F. after treatment followed by a varying period of observation. The cases seen at Gadau are, in general, of a severe type and require a long course of antrypol and tryparsamide before apparent cure is obtained; even then the C.S.F. is usually just outside normal limits. Diamidino stilbene is therefore subject to a very severe test when tried out on such cases. Nevertheless, after making allowances for this factor and for the relatively very small doses of the drug employed, the author is forced to conclude that the results are not very encouraging and do not justify the hope that the drug would have been as efficacious as antrypol and tryparsamide, even if used in large doses over a long period. It is possible that the present form of the disease at Gadau, resulting from a severe epidemic giving way in the course of years under intensive treatment to an endemic state of low incidence, is peculiarly unsuited to the drug, and that much better results may be expected elsewhere, as other workers' trials in fact indicate (Yorke, 1940)." *W. Y.*

HAWKING (Frank). **Three Cases of Trypanosomiasis Relapsing during Treatment with Bayer 205 (Germanin).**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1940. Aug. 16. Vol. 34. No. 2. pp. 217–226. With 1 graph.

This paper describes three cases of human trypanosomiasis at Kahama, Tanganyika, which relapsed during or shortly after a course of treatment with Bayer 205, and in which chemical estimations were made of the concentration of the drug in the blood.

Clinical details of the three cases are given. The relapses occurred 5, 9 and 19 days respectively after the last dose of the drug. Numerous trypanosomes appeared in the blood, and were accompanied by a febrile reaction. Although no further treatment was given at the time, the trypanosomes disappeared from the blood in a few days, and the fever subsided.

Strains of trypanosomes obtained from two of these patients were tested in rats, but no evidence of any abnormal resistance to Bayer 205 was discovered.

Chemical estimations of the concentration of the drug in the blood of the patients, at the time of the relapse and during subsequent treatment, showed that the accumulation of the compound in the blood was defective as compared with that of patients studied in a previous series. Hawking concludes that this defective accumulation was one of the main factors responsible for the relapses. *W. Y.*

ROSS (A. O. F.). **Comparison of the Toxicity of Tryparsamide and Neocryl in the Treatment of Neurosyphilis.**—*Brit. Med. Jl.* 1940. Aug. 31. pp. 283–284.

In this paper the author compares the toxicity of tryparsamide and neocryl (sodium succinanilomethylamide-p-arsenate) [this *Bulletin*, 1936, Vol. 33, p. 659]. His observations were based on a series of over 570 cases of neurosyphilis treated between 1936 and July, 1939, with one or other of these drugs.

The standard dose of each drug was 3 gm. intravenously once a week, until a total of 30 gm. had been administered; but in a few

cases, owing to age, infirmity, or other condition calling for caution, smaller doses were given. The author summarizes the toxic manifestations observed in the case of each drug in the following tables :—

TABLE I.—*Summarizing the Toxic Manifestations observed in* 256 *cases treated with Tryparsamide.*

Type	No. of Cases.	No. showing Toxic Signs before receiving 10 gm. of Drug	Total No. showing Toxic Signs	Percentage showing Toxic Signs	Toxic Reactions						
					Jaundice	Dermatitis	Visual Disturbance	Visual Damage	Vomiting	Others	Total
G.P.I.	30	2	3	10	1	0	1	1	0	0	3
Tabes	115	23	49	43	10	8*	23	4†	4	5	54
Taboparesis ...	11	1	2	18	1	0	0	1†	0	0	2
Neurosyphilis ...	45	6	17	38	4	4	10	4	0	0	22
Late syphilis ...	55	4	7	13	2	0	2	1†	2	0	7
Totals ...	256	36	78	30	18	12	36	11	6	5	88

* One developed purpura. † One became blind.
N.B.—47 out of the 88 reactions affected vision.

TABLE II.—*Summarizing the Toxic Manifestations observed in* 314 *cases treated with Neocryl.*

Type	No. of Cases	No. showing Toxic Signs before receiving 10 gm. of Drug	Total No. showing Toxic Signs	Percentage showing Toxic Signs	Toxic Reactions						
					Jaundice	Dermatitis	Visual Disturbance	Visual Damage	Vomiting	Others	Total
G.P.I.	58	0	3	5	0	1	0	1*	1	0	3
Tabes	90	1	7	8	3	0	0	2*†	1	1	7
Taboparesis ...	31	1*	3	10	2‡	0	0	1*	0	0	3
Neurosyphilis ...	50	4	9	18	2	4	0	0	3	0	9
Late syphilis ...	85	1	5	6	2	2	0	0	1	0	5
Totals ...	314	7	27	9	9	7	0	4	6	1	27

* One had optic atrophy before treatment and the visual condition deteriorated; 9 other cases with optic atrophy were treated without ill effect.
† One suddenly became blind. ‡ One died of toxic jaundice.

The following are the summary and conclusions :—

"A series of 570 unselected cases were treated either with tryparsamide or neocryl. The drugs were given in equal amounts, and 256 received tryparsamide and 314 neocryl.

"About twelve months after the work had been completed a survey was made of the records with a view to comparing the therapeutic effects and toxic manifestations of the two compounds. This survey confirmed the earlier impression that neocryl is not in any way inferior to tryparsamide as a therapeutic agent and that toxic effects from its use are much less common than are those caused by tryparsamide. Of 256 cases treated with tryparsamide 78 exhibited toxic manifestations, whereas of 314 cases treated with neocryl only 27 showed toxic signs.

"Both compounds may cause jaundice, dermatitis, and other undesirable reactions that are seen after the administration of trivalent arsenicals; but it is chiefly in its relative innocuity to the optic nerve that the advantages of neocryl become apparent.

"Visual disturbance occurred in 47 of the 78 cases which reacted unfavourably to tryparsamide: in 36 of these the signs were subjective, but in 11 they were objective, 3 of the latter patients becoming totally blind.

"Neocryl could, however, be held accountable for only one case of visual damage. This occurred in a patient with tabes dorsalis, who unfortunately became suddenly blind; before treatment the patient did not complain of subjective signs and the acuity of vision was apparently good, but it was not possible to have his eyes examined by an ophthalmic surgeon.

"It would appear from this analysis that neocryl is to be preferred in all cases of neurosyphilis in which the administration of pentavalent arsenicals is necessary." *W. Y.*

BEERMAN (Herman) & SHAFFER (Bertram). **Reactions to Tryparsamide. A Review of Ten Years' Experience.**—*Brit. Jl. Ven. Dis.* 1940. July–Oct. Vol. 16. pp. 145–165. [74 refs.]

OAG (R. Knight). **Attempts to cultivate Trypanosomes in the Developing Egg.**—*Jl. Path. & Bact.* 1940. July. Vol. 51. No. 1. p. 137.

Thirty-five chick embryos, 8 to 12 days old, were inoculated with the blood of a mouse heavily infected with *Trypanosoma brucei*. Seven of these embryos showed trypanosomes three or four days later; their blood was inoculated into 31 other embryos, with negative results. In another experiment 9 embryos, 19 days old, were inoculated with infected mouse blood and allowed to hatch, but none of the resulting chicks was infected. Similar negative experiments were performed with *T. congolense* and *T. equiperdum*. [See also this *Bulletin*, 1940, Vol. 37, pp. 12, 409]. *W. Y.*

GASIĆ LIVACIĆ (Gabriel) & CHAIT (Pablo). Once nuevos casos de enfermedad de Chagas en Chile. [**Eleven More Cases of Chagas's Disease in Chile.**]—*Rev. Chilena de Hig. y Med. Preventiva.* 1939. July–Dec. Vol. 2. No. 7–12. pp. 215–245. With 11 figs. [33 refs.]

The authors give brief details of eleven more cases of Chagas's disease seen by them in Chile. There is nothing special to note about their clinical symptoms. The ages of the patients ranged between 5 and 36 years. Diagnosis was made in one by examination of the blood in thick drop and confirmed by a positive Machado reaction and by xenodiagnosis; in another by inoculation into a dog and a positive Machado reaction; in the remaining nine by the xenodiagnostic method supported, in seven of them, by a positive Machado reaction. Geographically, nine were in the Department of Huasco (6 in Domeyko, one each in Cachiyuyo, Malaguir and Conay), one in the Department of Chañaral and one in Elqui. *H. H. S.*

GASIĆ LIVACIĆ (Gabriel). Primer caso de enfermedad de Chagas confirmado en Domeyko mediante el xenodiagnostico. [**The First Case of Chagas's Disease confirmed by Xenodiagnosis in Domeyko.**]—*Rev. Chilena de Hig. y Med. Preventiva.* 1939. July–Dec. Vol. 2. No. 7–12. pp. 211–214. With 1 fig.

MAZZOTTI (Luis). Resultados obtenidos por la inoculación de ratones con pequeñas y grandes cantidades de *Trypanosoma cruzi*. [**Results of inoculating Mice with** *T. cruzi*.]—*Rev. Inst. de Salubridad y Enfermedad. Trop.* Mexico. 1940. May. Vol. 1. No. 2. pp. 181–187.

For obtaining material for injection the author used either the intestinal contents of an infected Triatoma, diluted with saline, or the citrated blood of infected mice. The number of animals used was few and the results showed considerable variation, but may be briefly recorded.

Six mice were injected by the first-named material, the number of parasites ranging from 800 to 8,000. Some showed parasites in their blood after an interval, others which had received the same number by injection did not do so at any time. Thirty-eight others were injected with the citrated blood and with trypanosomes from 46 to 16½ million. Those receiving the smaller numbers, 46–92, did not die during an observation period of 3 weeks; those receiving larger quantities, 1,850,000 and upwards, died within that period, but none earlier than 14 days, the interval being taken probably by the trypanosomes gaining access to the internal organs and producing lesions serious enough to kill. It is noteworthy that some of the animals receiving the lower (of the large) dosage exhibited more marked effects than others receiving the largest amounts. *H. H. S.*

KOLODNY (Maxwell H.). **The Effect of Environmental Temperature upon Experimental Trypanosomiasis** (*T. cruzi*) **of Rats.**—*Amer. Jl. Hyg.* 1940. July. Vol. 32. No. 1. Sect. C. pp. 21–23.

The effect of environmental temperature on resistance to infection is a problem of great importance. The author briefly refers to previous observations on this subject, dealing with infections due to typhus rickettsiae and encephalitis. The present work reports analogous observations relating to the effect of abnormal environmental temperatures upon the resistance of albino rats to experimental infection with *Trypanosoma cruzi*.

The author summarizes his observations as follows:

"Abnormal deviation of environmental temperature is capable of influencing the resistance of young rats to experimental infection with *Trypanosoma cruzi*. While raised environmental temperature (90° to 95°F.) increases only slightly the resistance of the rats to infection with this parasite, a lowered environmental temperature (40° to 45°F.) generally results in heavy blood-stream invasion, several times more intense than is usually seen in animals of the same age maintained at ordinary room temperature. Under these conditions, an ordinarily mild infection becomes exceedingly acute and almost invariably goes on to a fatal termination." *W. Y.*

i. PACKCHANIAN (Ardzroony). **Natural Infection of** *Triatoma heidemanni* **with** *Trypanosoma cruzi* **in Texas.**—*Public Health Rep.* 1940. July 19. Vol. 55. No. 29. pp. 1300–1306. With 2 plates. [11 refs.]

ii. ——. **Experimental Transmission of** *Trypanosoma cruzi* **Infection in Animals by** *Triatoma sanguisuga ambigua*.—*Ibid.* Aug. 23. No. 34. pp. 1526–1532. With 2 plates. [13 refs.]

i. The author found that 65 per cent. of *Triatoma heidemanni*, collected during 1937 and 1938 in Temple, Texas, were naturally

infected with *Trypanosoma cruzi*. The strain of *cruzi* produced infection in monkeys, mice, rats and guineapigs.

ii. This paper describes the experimental infection of *Triatoma sanguisuga ambigua* with *Trypanosoma cruzi*, and the transmission of the infection by this insect to susceptible animals.

Triatoma sanguisuga ambigua is widely distributed in Florida. During 1936–1937, about 300 of these bugs collected in Sarasota were examined and found to be free from *T. cruzi* infection. Over 50 people bitten by these insects in Civilian Conservation Corps camps during 1936–37 manifested various allergic symptoms and occasionally a small abscess, but none of them became infected with trypanosomes.

W. Y.

GASIĆ LIVACIĆ (Gabriel). Indice de infestación por *Tripanosoma cruzi* de los triatomideos del departamento de Elqui. [**Degree of Infestation with *T. cruzi* of Triatomidae in Elqui Department, Chile.**]—*Rev. Chilena de Hig. y Med. Preventiva.* 1939. July–Dec. Vol. 2. No. 7–12. pp. 205–210. With 1 map.

The author examined Triatomidae obtained in 15 localities in the department and found among a total of 1,241 that 355, or 28·6 per cent., were positive for *T. cruzi* infection. The numbers obtained for examination were usually small, in five localities only did they exceed a hundred and these may be mentioned: In Tres Cruces of 241 examined, 102 or 42·3 per cent. were positive; in Paihuano 35 out of 194 (18 per cent.); in Montegrande 62 out of 159 (38·9); Pabellon 52 out of 139 (37·4) and Nueva Elqui 8 out of 129 (6·2 per cent.). In the first four of these, imagines, nymphs and larvae were positive, the imagines particularly; in Nueva Elqui larvae were not found infected, but only 13 of them were examined, whereas 45 adults yielded 6 positive, and 71 nymphs two positive. Altogether of 509 adults 204 were positive (40 per cent.), of 324 nymphs 71 (21·9 per cent.), of 408 larvae 80 (19·6 per cent.). *H. H. S.*

GASIĆ LIVACIĆ (Gabriel) & BERTÍN (Victor). Animales reservorios de virus de la tripanosomosis americana en Chile. (Comunicación preliminar.) [**Animal Reservoirs of the Virus of American Trypanosomiasis in Chile.**]—*Rev. Chilena de Hig. y Med. Preventiva.* 1939. July–Dec. Vol. 2. No. 7–12. pp. 247–261. With 7 figs. [22 refs.]

Up to the present animal reservoirs of the virus of Chagas's disease comprise 22 wild (or non-domestic) and the dog and the cat. The former include five species of Dasypus (*D. novemcinctus, sexcinctus, unicinctus, hybridus*, and *paraguayensis*), three of Chaetophractus (*C. vellerosus vellerosus, C. v. pannosus*, and *C. villosus*), three of Didelphys (*D. aurita, marsupialis*, and *virginiana*), two of Grisonella (*G. ratelina* and *huronax*), and the following: *Zoedyus pichy caurinus, Tolipentes matacos, Lutreolina crassicauda, Tayra barbara, Marmosa mitis, Chrysothrix sciurea, Neotoma fuscipes, Epimys norvegicus* and *Pseudalopex culpeus culpeus*.

In some districts the proportion of animals infected is high, *e.g.*, in Domeyko 20 out of 68 examined; dogs show a higher percentage of infection than do cats, 34·8 and 18·1 per cent. respectively. In young

animals diagnosis is usually readily made by examination of a thick drop of blood, in older animals the xenodiagnostic or other method is generally needed. *H. H. S.*

DUSSERT (Eduardo), FAIGUENBAUM (Jacobo) & NEGHME (Amador). La reacción de Machado en Chile. Comunicación preliminar. [**Machado's Reaction in Chile.**]—*Rev. Chilena de Hig. y Med. Preventiva.* 1939. July–Dec. Vol. 2. No. 7–12. pp. 197–203.

The Machado (or, more correctly, Machado-Guerreiro) reaction is a complement-fixation test devised in 1913 for diagnosis of American trypanosomiasis. The authors of this article record their findings in 50 suspected cases, 5 healthy persons, 7 syphilitics, and 4 puppies artificially infected. They find it of particular value in chronic forms of the disease, less in acute stages, rarely being positive till 30 days after infection. It is not absolutely specific, but rather a group reaction since positive results are obtained with sera of patients with African trypanosomiasis and leishmaniasis. The antigen is obtained from the spleen of infected puppies, not more than two months old, and the method is detailed. This consists of cutting the spleen into small pieces, ground in a mortar with fine quartz, and adding to the extract double its weight of distilled water and the organ's weight of glycerine, and allowing maceration to go on for 4 days at room temperature and for about the same period in the refrigerator. The supernatant liquid is filtered first through paper and then through a Seitz filter.

Of 50 sera sent up from suspected patients 38 were positive ; 8 of these were later confirmed by xenodiagnostic and thick drop methods, and the others lived in heavily infected districts. Repeated tests of the sera of five healthy subjects who had not lived in infected districts were always negative, as they were also in 7 syphilitics who gave strong Wassermann and Kahn reactions. Of the dogs experimentally infected, two, infected more than two months previously, gave positive reactions, two, infected 12 and 15 days before, were negative.

H. H. S.

TROPICAL DERMATOLOGY.

A REVIEW OF RECENT ARTICLES. VII*.

Blastomycosis.—A general review of the subject has been presented by CALLAWAY and MOSELEY[1] who stress the fact that they are dealing with primary cutaneous Gilchrist's Disease. They are convinced that many of the strains of fungi which have been isolated are really all one and the same organism and that this can be proved by their serological and morphological characteristics. Conant's proposal

* For the sixth of this Series see Vol. 37, pp. 95–104.

[1] CALLAWAY (J. Lamar) & MOSELEY (Vince). Primary Cutaneous Gilchrist's Disease.—*Southern Med. Jl.* 1940. June. Vol. 33. No. 6. pp. 622–625. [13 refs.]

that the name *B. dermatitidis* be used to designate the causative agent is now receiving wider acceptance but in spite of this name it must not be forgotten that in a few cases the disease progresses to the systemic form by way of the bloodstream or by the lymphatic system. The authors draw special attention to the possibility that iodide of potassium may not be without danger; in patients with marked sensitivity to the organism, the administration of this drug has caused spreading of the lesions. Preliminary desensitization with a vaccine, either stock or autogenous, seems to prevent this. GUILLIER and RADAODY-RALAROSY[2] describe two cases which they have seen in Diego-Suarez. The first patient was a native farmer, aged 35, who had never been far from his own village. The lesions had started as irritable papules of the buttock some fifteen years before. Otherwise a fit man, he had now developed extensive disease of the right buttock, the invasion having also spread down the inside of the thigh to involve the popliteal space. Within an irregular outline were tubercles, ulcers covered with greyish yellow crusts and white keloidal scars. Behind the knee the papillomatous processes were more cauliflower-like and active. The inguinal glands of that side were enlarged. Diagnosis was confirmed pathologically but treatment proved completely unavailing in spite of the exhibition of iodide of potassium, anthiomaline and crisalbine. The second case also concerned a native farmer, this one being aged 38, and again the antecedent history covered fifteen years. The right knee was the original site of infection but the disease had spread to involve the leg, the dorsum of the foot, the whole of the thigh and the inner side of the right buttock. Isolated tumours varied in shape and size, the largest being no larger than a pigeon's egg. The intervening surfaces were rough, fissured and crusted but no true ulceration was seen nor was there any keloidal scarring. Enlargement of the inguinal glands, the pathological findings and the failure of treatment were points of resemblance between this and the first case, but on this occasion mercury and bismuth also proved useless. In both patients the histological changes in the epithelium showed some very carcinomatoid cells. Five cases are reported from Madagascar by RADAODY-RALAROSY[3]. On each occasion the diagnosis proved difficult but was ultimately confirmed histologically. One of these patients was a farmer who also showed buttock lesions. Elephantiasis of the vulva in another was accompanied by endometritis. In two patients involvement of the buccal mucosa suggested epulis, whilst in the fifth osteoarthritis of the astragalus was accompanied by local suppuration suggesting a tuberculous joint. The effect of mouse passage on the cultural characteristics of the organisms causing blastomycosis and their virulence for mice has been studied by BAKER[4] in North Carolina. Virulence was judged by the duration of survival of the animals after

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[2] GUILLIER (G.) & RADAODY-RALAROSY (P.). Sur deux cas de blastomycose cutanée du type Gilchrist.—*Bull. Soc. Path. Exot.* 1940. Jan. 10. Vol. 33. No. 1. pp. 33–42. With 1 plate. [40 refs.]

[3] RADAODY-RALAROSY (P.). Sur cinq nouveaux cas de blastomycose; difficulté du diagnostic clinique.—*Bull. Soc. Path. Exot.* 1940. Feb. 14. Vol. 33. No. 2. pp. 139–143.

[4] BAKER (Roger Denio). The Effect of Mouse Passage on Cultural Characteristics and Virulence for Mice of Organisms causing Blastomycosis.—*Amer. Jl. Trop. Med.* 1939. Nov. Vol. 19. No. 6. pp. 547–563. With 2 plates. [10 refs.]

intraperitoneal inoculation and by the extent of the lesions produced. Two strains of *B. dermatitidis* were investigated, both having been obtained from the collection of fungi in Duke University. One strain was from a case seen in 1931 and the other was from a patient seen two years later. It was found that repeated transfer did not enhance their virulence. The yeast forms were obtained from the mycelial forms as readily by growing the organism directly on blood agar at 37°C. as by first passing it through a mouse. The repeated mouse transfer did not alter the cultural and microscopical appearances of each organism in the above conditions of temperature and medium.

Chromoblastomycosis.—The specific fungi of this disease have been investigated by CARRIÓN[5]. Each of the several distinct organisms possesses a complicated and variable morphology. Classification is of course difficult and can only follow very prolonged study and observation, particularly on different culture media. Corn meal and Czapek's agar are especially recommended. The author worked with 28 specimens obtained from cases in ten different countries. He claims that, of these, five were *Phialophora verrucosa* Medlar 1915, one was *Fonsecaea compactum* Carrión 1935 and the remaining 22 were *F. Pedrosoi* (Brumpt) Negroni 1936, *emend.* In this very full and well illustrated study the various synonyms are necessarily discussed and particular attention is paid to the variable proportions of sporulation which may occur in different strains.

Actinomycosis.—An example of this disease has been seen by DE ALMEIDA[6] in a Canadian boy living in the Paraguayan Chaco. The right anterior axillary fold and adjacent part of the chest were affected. The paper is not concerned with a clinical description, which is left to a photograph to demonstrate. Direct examination of the pus immediately revealed dark grains. On Sabouraud's medium these developed colonies which were at first pseudomembranous. There was a raised dark central portion with a surrounding white band and outside this there was a clear chocolate-coloured zone of growth. After about two months these colonies become cerebriform and almost white. These features are, however, presented right from the beginning when potato is used as the medium. The fungus does not liquefy gelatine and does not form a membrane in any fluid media other than milk. Microscopically the filaments are seen to be thin (1μ is the greatest diameter), Gram-positive and not resistent to acid alcohol. These characteristics lead the author to think that this is a new species and he has proposed that it be called *A. paraguayensis* Almeida *n.sp.*

Tinea tonsurans and *Tinea circinata.*—CATANEI[7] has continued his work in Algeria and the present paper concerns itself only with adult affections. Favus of the skin has been seen on four occasions, three of the patients being of European parentage and only one being a native. In all the organism was proved to be *A. schönleinii.* Observation of these patients is important, however, in that three of them

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[5] CARRIÓN (A. L.). The Specific Fungi of Chromoblastomycosis.—*Puerto Rico Jl. Public Health & Trop. Med.* 1940. June. Vol. 15. No. 4. pp. 340–361. With 5 plates. [33 refs.]

[6] DE ALMEIDA (Floriano). Study of a Black Grain Mycetoma due to *Actinomyces paraguayensis* Almeida, n.sp.—*Mycopathologia.* The Hague. 1940. Mar. 26. Vol. 2. No. 3. pp. 201–203. With 11 figs. on 2 plates.

[7] CATANEI (A.). Sur des teignes de l'adulte observées en Algérie.—*Arch. Inst. Pasteur d'Algérie.* 1940. Mar. Vol. 18. No. 1. pp. 6–9.

showed only erythemato-squamous discs without any trace of typical cups. Among six ordinary cases of ringworm of the glabrous skin, three were caused by *Ctenomyces mentagraphytes*, two by *Trichophyton glabrum* and one by *Tr. violaceum*. In view of the very large number of patients who have been seen in North Africa by this worker, who has a particular interest in ringworm infections, these small numbers prove how very rare this disease is in adults in that area. CASTELLANI[8] has described three new species of Trichophyton. *Tr. batonrougei* was isolated from four cases of *tinea capitis* in Negro children of New Orleans. This is apparently an endothrix whose chestnut colour on glucose agar cultures is quite characteristic. It also develops peculiar sporiform bodies in large roundish structures resembling chlamydospores. *Tr. guzzonii* shows cultures of glucose agar which are very like those of *Tr. dankaliense* Castellani but the peculiar clusters of spores seen in that fungus are not here noted. The organism was isolated from a patch of ringworm on the back of a Negro boy in New Orleans. *Tr. tenuishypha* was detected in London on a European woman who had lived in the West Indies and who complained of a generalized irritation accompanied by small reddish patches on the left forearm and trunk. The cultures were fluffy and the duvet later became black. The hyphae were very thin. The paper is concluded by a few notes on *Tr. louisianicum* which has been found in ringworm of the scalp among Negro boys in New Orleans.

Epidermophytosis.—The same author[9] has written a paper concerned with the cultural characteristics of *Geotrichum rotundatum* Castellani 1911 and *G. rotundatum* var. *gallicum n.v.*, the latter differing from the former in that the mycelial hyphae are smaller and it does not acidify nor clot milk. The two patients from whom these specimens were obtained were clinically ordinary cases of ringworm of the feet, one having acquired the disease in India and the other in the south of France.

Tinea imbricata.—The first case to be recognized in Guatemala is described by FIGUEROA and CONANT[10]. Two months before she was seen a twenty year old native girl had had measles, after which some desquamation developed. Gradually it was realized that the extent of this was abnormal and when she was seen by the authors the whole of her body and limbs was covered with scales. These were dirty white and their free edges pointed towards the centres of concentric circles. Some capricious patterns were also seen. The designs could be "developed" and demonstrated easily by rubbing a gentian violet ointment vigorously into the skin. Then a bath the following day removed the violet from the healthy skin. Colour remained at the bases of the scales and declared the patterning, which is well illustrated. Cultures were made and the findings led to a discussion about the

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[8] CASTELLANI (Aldo). Brief Notes on Three New Species of Trichophyton (*T. batonrougei, T. guzzonii, T. tenuishypha*) and a Little Known Species (*T. louisianicum*).—*Jl. Trop. Med. & Hyg.* 1939. Dec. 15. Vol. 42. No. 24. pp. 373–378. With 13 figs. and 1 coloured plate.

[9] CASTELLANI (Aldo). Mycotic Eczematous Dermatitis of the Toes probably due to *Geotrichum rotundatum* Cast. 1911, and *Geotrichum rotundatum* var. *gallicum* n.v.—*Jl. Trop. Med. & Hyg.* 1940. Mar. 15. Vol. 43. No. 6. pp. 79–81. With 5 figs.

[10] FIGUEROA (Horacio) & CONANT (Norman F.). The First Case of *Tinea imbricata* caused by *Trichophyton concentricum* Blanchard, 1896, reported from Guatemala.—*Amer. Jl. Trop. Med.* 1940. Mar. Vol. 20. No. 2. pp. 287–303. With 8 figs. & 1 plate. [35 refs.]

causative fungi. The authors are strongly of the opinion that all varieties are really *Endodermophyton concentricum* even when they have been named *E. tropicale, E. indicum, E. castellani, E. mansoni* and *E. roquettei*.

Pinta.—A most important paper has been written by SAENZ, TRIANA and ARMENTEROS[11] who have been working in Cuba. In this malady the misdiagnosis of syphilis has been extremely common and this is readily understood as the lesions show slow evolution, slight atrophy, resolution of elevated, infiltrated and polycyclic patches under anti-syphilitic treatment. A positive Wassermann reaction is nearly always found. Yet the possibility that syphilis is the real cause is disproved by histological preparations. Other difficulties may be traced to the fact that hyperkeratotic lesions of the palms and soles have only been seen in this disease in Cuba, a statement with which Howard Fox agrees. Vitiligoid changes have been seen on the wrists similar to those seen in cases of carate in Colombia. Some thirty cases have been investigated most carefully and one outstanding feature is that the disease first shows itself in the Cuban patients on the palms and soles. Irregular hyper-pigmented blue spots appear. These enlarge, become keratotic, fuse and cover the whole area with dry yellowish squames. Fissuring develops later, whilst pigment is ultimately lost so that permanently achromic areas are seen. On the wrists the pigmentary changes are always of the slate blue variety with a slightly raised and infiltrated edge. The disease affects the distal parts of the limbs only and other colour varieties have not been seen in Cuba. Some cases have shown enlargement of the lymph glands or juxta-articular nodules. The Wassermann reactions remained positive even after the lesions had yielded to treatment. Of the 30 cases, 7 or 23·3 per cent. had aortic or cardiac lesions or both. Three of the patients had a positive globulin test, a syphilitic gold curve and a positive Meinicke test with the cerebrospinal fluid. In all the cases the authors have done their very best to exclude the possibility of syphilis and yaws. It was in 1938 that they first found the causative spirochaete in serum obtained after abrading the epidermis of dyschromic lesions of the wrists and angles of a Negro janitor aged sixty. The organism can be seen on dark ground examination and is morphologically identical with *S. pallida* and *S. pertenuis*. Later the spirochaete was obtained from a lymph node. Repetitions of the experiments were successful. Then biopsy showed the organisms in the prickle cells of the epithelium. Out of a grand total of 140 cases which have now been examined by these workers and others in Mexico and Havana, 135 have proved positive and in only five of the patients have spirochaetes not been found. Previous failures are explained by antecedent treatment or by material having been taken from leucodermic lesions or from regressed patches. In the subsequent discussion the authors were congratulated by many speakers and in particular by Howard FOX who stated that this discovery at last refuted the theory of a fungus causation. PARDO-CASTELLO pointed out that the disease is practically restricted to the coloured races (it has only twice been detected in whites) and that its limitation to

[11] SÁENZ (Braulio), in collaboration with Juan Grau TRIANA & J. Alfonso ARMENTEROS. Pinta in Cuba. Special Clinical Features of the Cuban Cases and Discovery of a Spirochete in Active Lesions and in the Lymph Glands.—*Arch. Dermat. & Syph.* 1940. Mar. Vol. 41. No. 3. pp. 463–477. With 9 figs. [17 refs.]

the tropic belt of America alone, separates it from syphilis apart from all other points. Palmar lesions similar to those seen in yaws cannot be unexpected as they are similar maladies. [See also below, and this *Bulletin*, 1940, Vol. 37, pp. 104–106.] *Sydney Thomson.*

LEÓN Y BLANCO (Francisco). El treponema Herrejoni. [*Spirochaeta herrejoni.*]—*Rev. Med. Trop. y Parasit.* Habana. 1940. Jan.–Feb. Vol. 6. No. 1. pp. 5–12. With 3 figs. on 2 plates. [25 refs.] English summary.

For many years pinta or caraate was regarded as a mycosis due to various species of chromogenic fungi. In 1927 Salvador GONZÁLEZ HERREJÓN formulated the hypothesis that the condition was due to a treponema. The turns are fairly close, movement when fresh as lively as that of *Sp. pallida*, but in one to six hours according to medium and temperature it becomes more and more sluggish. It has a length varying between 7·8 and 36·8μ, the majority being between 12 and 18μ and the average of 500 specimens was 17·8μ; its thickness is 0·25–0·3μ, the depth of spiral 0·8–1·0μ and the intervals between them the same. It stains readily by the usual silver methods; is dissolved readily in 10 per cent. saponin, by sodium taurocholate or by bile, at room temperature. Attempts at cultivation have so far failed, as have inoculation experiments in rabbits. The sera of patients give a positive Wassermann reaction; the organism is found in the malpighian layer of the skin. *H. H. S.*

VARELA (Gerardo) & NIETO ROARO (Daniel). Nota acerca de la morfologia del treponema del mal del Pinto. [**The Morphology of the Spirochaete of Pinta.**]—*An. Inst. Biol.* Mexico. 1940. Vol. 11. No. 1. pp. 35–39. With 5 figs.

The spirochaete of pinta shows certain staining differences from most other spirochaetes; it does not stain with basic stains and is Gram-negative. Stained by Giemsa's solution or by the Fontana method it is seen to have a flexible cylindrical form, with pointed ends, 11–12 microns in length, with turns 0·6–1μ wide, 0·4–0·5μ deep, 9–10 in number. Sometimes longer forms up to 18μ in length are seen, thinner in the middle, as if stretched, probably indicating division. The following shows the resemblances and differences between it and that of syphilis. The table is abstracted from one by the authors, certain differences will be noticed between statements there and in the text :—

	Syphilis	Pinta
Body	Cylindrical and flexible	Cylindrical and flexible
Ends	Pointed	Pointed
Length	8–14μ	12–18μ (but see text)
Width of turns ...	1·0μ	1·5μ (but see text)
Depth of turns ...	0·8–1·0μ	0·4–0·5μ
No. of turns ...	8–14	9–10
In bile	Dies in 30 minutes	Dies at once
In water	Movement ceases	Movement ceases
Division	Transverse	Transverse (?)
Mobility	Rotatory and by flexion	Rotatory and by flexion

H. H. S.

PARDO-CASTELLÓ (V.). El treponema del mal del Pinto. (*Treponema pictor*, Grau-Alfonso). [**The Spirochaete of Pinta.**]—*Rev. Med. Trop. y Parasit.* Habana. 1940. Mar.–Apr. Vol. 6. No. 2. pp. 117–118.

The author complains that Dr. LEÓN Y BLANCO in giving the spirochaete of pinta the specific name of *herrejoni*, after the Mexican dermatologist, Salvador GONZÁLEZ HERREJÓN, is perpetrating an injustice to the original discoverers Juan GRAU and José ALFONSO, who saw it by dark ground examination of the lymph of pinta patients in Cuba. He suggests the name *Treponema pictor*, Grau-Alfonso. [Whether the organism is generically a spirochaeta or treponema, by the laws of nomenclature the specific name of *herrejoni* already bestowed cannot be changed thus arbitrarily.] *H. H. S.*

LEÓN Y BLANCO (Francisco). Tercera nota sobre la trasmision experimental del mal del Pinto de persona a persona. [**Experimental Transmission of Pinta.**]—*Vida Nueva.* 1939. Sept. 15. Vol. 44. No. 3. pp. 143–156. With 9 figs. [10 refs.] English summary.

The author has carried out a series of inoculation experiments from pinta subjects and finds that over the site of an exfoliation a drop of sweat or discharge may contain virulent spirochaetes, and in large numbers where there are keratotic lesions with oozing and these can easily infect others with skin erosions. Crushing of biting insects which have bitten a pinta sore may infect the abraded skin of another person: with Simulium this is believed to be certain, with the bed bug possible. Pinta patients who have been thoroughly cured some time before may be re-infected, but the initial lesion is often atypical. Patients recently treated are not infectable, not because of immunity but because the drug, arsenic or bismuth is still present and prevents development of the spirochaete. There is no cross immunity between pinta and syphilis. Primary syphilis may occur unmodified in a pinta subject and *vice versa.* *H. H. S.*

LEÓN Y BLANCO (Francisco). Cuarta nota sobre la trasmisión experimental del mal del pinto de persona a persona. [**Transmission of Pinta from Sick to Healthy.**]—*Rev. Med. Trop. y Parasit.* Habana. 1940. Jan.–Feb. Vol. 6. No. 1. pp. 13–20. [10 refs.] English summary.

For these experiments volunteers offered themselves, and were divided into groups: (1) Normal, with no syphilitic history and negative to serological tests; (2) Syphilitics with marked positive sera; (3) Those who had suffered from pinta but had been cured; (4) Subjects with active pinta, strong positive sera and abundant spirochaetes in some of the lesions. As results of his experiments the author concluded:—

1. In every one of 254 cases observed the erythematous squamous lesions for which he proposes the name 'Pintids' are the primary lesions and the spirochaete could be found in all.
2. The fluid collected from such lesions, whether pigmentary or leucodermic, produced on inoculation similar primary lesions which differ fundamentally from that of either syphilis or yaws.

3. Such primary lesion never ulcerates, but is always a "closed papule" another distinction from syphilis or yaws.

4. Transmission may be successfully carried out from any clinical type of lesion at any stage of the disease. If any intermediate host acts as transmitting agent, there is no reason to suspect any cyclical development within it.

5. Since infection may follow deposition of infective material on any little abrasion direct transference is very probable in nature.

6. Syphilis and Mal del Pinto are not mutually antagonistic and neither affords immunity to the other.

7. One attack of pinta does not protect against re-infection. Such was found to be possible two months after recovery from the disease in the primary period and approximately four years after recovery from the dyschromic type. *H. H. S.*

LEÓN Y BLANCO (Francisco). La lesión inicial en el mal del pinto. [**The Primary Lesion in Pinta.**]—*Rev. Med. Trop. y Parasit.* Habana. 1940. Jan.–Feb. Vol. 6. No. 1. pp. 21–37. With 9 figs. on plates. [50 refs.] English summary.

The site of the primary lesion is practically always on some uncovered part of the body. Of 254 cases, in 163 it was on the leg or dorsum of the foot, on the thigh in 3, the buttock 3, the forearm or dorsum of the hand 67, arm 3, face 14, neck 1. It appears as a papule, after an incubation of 7 to 20 days, becoming in 30 to 50 days an erythematous squamous patch, at the periphery of which other papules may develop and spread similarly. Skin rashes or multiplication of papules, for which the author suggests the term Pintids (v.s.), characterize the second stage and are seen usually in 5–12 months from the appearance of the initial lesion which itself continues to develop at the same time. The third stage is the dyschromic with coloured or achromic spots, keratoderma or superficial atrophy.

During the first stage the W.R. is negative and superinfection is possible; in the second stage the reaction becomes positive, but superinfection is still possible; in the third nearly all (some say 100 per cent.) give a positive W.R. and in this stage attempts at experimental superinfection do not succeed. The *Sp. herrejoni* can always be found between the cells of the malpighian layer of the skin in the initial lesion. The dermis is infiltrated with many lymphocytes and plasmocytes, but polymorphonuclears and eosinophils are few; melanophores and histiocytes are present. Hair follicles and coiled sweat glands are surrounded by infiltration cells. *H. H. S.*

LEÓN Y BLANCO (Francisco). La presencia de treponemas Herrejoni en la serosidad de las grietas, fisuras y rasguños de las lesiones cutaneas en el mal del pinto. [**The Presence of *Spirochaeta herrejoni* in the Discharge from Cutaneous Lesions of Pinta.**]—*Rev. Med. Trop. y Parasit.* Habana. 1940. Jan.–Feb. Vol. 6. No. 1. pp. 47–48. English summary.

The cutaneous lesions of pinta do not spontaneously ulcerate like those of syphilis or yaws but by scratching they may become fissured and so 'open' lesions. In the serum exuding from such lesions the spirochaetes were found in 29 out of 41 patients and experiment has shown that the disease is readily transmitted to a slight wound,

scratch or abrasion on a healthy skin by the discharge from a pinta lesion ; in other words the serum oozing from a fissured pinta lesion is infective and virulent. *H. H. S.*

LEÓN Y BLANCO (Francisco). La eosinofilia local en el mal del pinto. [**Local Eosinophilia in Pinta Lesions.**]—*Rev. Med. Trop. y Parasit.* Habana. 1940. Jan.–Feb. Vol. 6. No. 1. pp. 49–51. English summary.

Eosinophilia is not always present in pinta lesions (see above), but in the scaly and infiltrated lesions and those with keratosis eosinophils are seen scattered in the infiltrations and in the neighbourhood of the small vessels. Where the inflammatory reaction is slight they are scarce, but are usually in considerable numbers in the period of extension of lesions, though one patient may show many, another only a few ; the same applies to patients with adenitis. *H. H. S.*

LEÓN Y BLANCO (Francisco). Histologia patologica de las lesiones cutaneas y de los glanglios linfaticos en el mal del pinto. [**Histology of the Skin Lesions and Glands in Pinta.**]—*Rev. Med. Trop. y Parasit.* Habana. 1939. Nov.–Dec. Vol. 5. No. 6. pp. 329–345. With 16 figs. on 8 plates.

LEÓN Y BLANCO (Francisco). Las reacciones de Wassermann y Kahn en el periodo primario del mal del pinto. [**The Wassermann and Kahn Reaction in the Primary Stage of Pinta.**]—*Rev. Med. Trop. y Parasit.* Habana. 1940. Jan.–Feb. Vol. 6. No. 1. pp. 39–42. [11 refs.] English summary.

Seventeen experimentally inoculated persons and 39 naturally infected patients in the first stage of pinta were examined as to their serological reactions. The tests were carried out at the time of inoculation of the former group, 20 days later and when treatment was begun, and in the latter group before start of treatment. In no case was a positive reaction given to either the Wassermann or the Kahn test. *H. H. S.*

LEÓN Y BLANCO (Francisco). Acción de la fiebre sobre las lesiones cutaneas en el mal del pinto. [**Effect of Fever on the Lesions of Pinta.**]—*Rev. Med. Trop. y Parasit.* Habana. 1940. Jan.–Feb. Vol. 6. No. 1. pp. 43–45.

Eight patients with pinta developed fever, 7 of them malaria (4 *P. vivax*, 3 *P. falciparum* infections) and 1 smallpox. After the fever started, search for *Sp. herrejoni* revealed none. The malaria patients had had 10 or more accessions of fever. They were treated with atebrin and the patients were observed every week for two months ; in some the pigmented spots almost entirely disappeared after the febrile attacks, in others there was a smaller degree of change. After five weeks, however, fresh signs of activity appeared, the patches acquired an erythematous border and the pigmentation returned, but only in parts of the original sites and spirochaetes were few and could be found only after prolonged search. The fever seemed to exert a lethal effect on the spirochaetes, but did not destroy them all. If a patient presents himself with signs indicative of pinta and spirochaetes cannot be found, enquiry should be made as to whether he has recently suffered from malaria or other febrile condition. *H. H. S.*

SOBERÓN Y PARRA (Galo). Sobre el origen del tratamiento del mal del pinto por los arsenicales y bismuticos en Mexico. [**Arsenicals and Bismuth in the Treatment of Pinta in Mexico.**]—*Rev. Med. Trop. y Parasit.* Habana. 1940. Jan.–Feb. Vol. 6. No. 1. pp. 53–54.

Till about 20 years ago pinta was commonly treated by mercury injections, or by inhalation of the vapour as occurred in workmen engaged in calcining cinnabar in the mines of Huitzuco, Guerrero. From 1920 onwards the author employed arsenicals and bismuth salts for this disease and found that a total dosage of 90 cgm. of salvarsan cured nearly all pinta patients completely, except for the white patches which rarely were cured. *H. H. S.*

TRIBEDI (B. P.) & MUKHERJEE (B. N.). **Actinomycotic and Mycotic Lesions, with Special Reference to 'Madura Foot.'**—*Brit. Jl. Surgery.* 1939. Oct. Vol. 27. No. 106. pp. 256–265. With 10 figs. (6 coloured). [11 refs.]

The authors place on record three more cases of Madura mycosis. Of 32 cases collected from the Medical College, Calcutta, in 23 the part affected was the foot, in 3 the arm, the jaw and breast each 2, 1 in the back and 1 of the sigmoid. Of the three fresh cases reported, 2 were due to *Actinomyces madurae* with the ochroid type of granules, the second being complicated by a *Staph. aureus* infection. The third patient was a Hindu male of 40 years, with a painful and swollen foot ; the condition had first been observed 12 years before. The skin of the foot was black, tense, with discharging sinuses, and section of the amputated foot presented the appearance of inflamed tissue dusted with charcoal. Attempts at cultivation of the fungus yielded a hyphomycete with lateral and terminal buds, but no true branching. It grew well on nutrient agar, giving white star-shaped woolly colonies with a central blackening. Club-formation from tissue reaction was seen in the first two cases, but not in the third. [There is no mention of any attempts to identify the fungus in the third patient.]

H. H. S.

NEGRONI (Pablo) & TEY (Juan A.). Estudio micológico del primer caso argentino de micetona [*sic*] maduromicósico de granos negros. [**Mycological Study of a Black-grain Mycetoma in the Argentine.**]—*Rev. Inst. Bacteriológ.* Buenos Aires. 1939. Dec. Vol. 9. No. 2. pp. 176–189. With 6 figs. [24 refs.] English summary.

This study was in connexion with what is believed to be the first Argentine case of maduromycosis with black grains. It deals solely with the fungus and no clinical history of the patient is given. The grains had an average diameter of 3 mm., a septate mycelium 3μ thick and numerous chlamydospores. On solid media it formed green velvety colonies with yellow zones. Its optimum temperature for growth was 30°C., and it grew best on media with galactose, sucrose, maltose, dextrin, mannitol and sorbitol, less well on dextrose, mannose and laevulose, and still less on lactose and inulin. Sugars were not fermented. It slightly liquefied gelatin. The fungus proved to be *Aspergillus* (*Eurotium*) *chevalieri* Mangin, 1909. *H. H. S.*

TORRES (D. M. Gonzales). Actinomicetoma toracico a grãos pretos. Considerações sobre um caso. [**Black-grain Actinomycosis of the Thorax.**]—*Arquivos de Biol.* S. Paulo. 1940. Jan. Vol. 24. No. 223. pp. 8–10. With 6 figs.

The case of a man of 23 years of age, engaged in cotton cultivation, is related. Six years previously he noticed some small ulcers (flictenas) and nodules on the right shoulder and upper part of the right side of the chest. In the early days they were associated with itching and discharged a blood-stained fluid with small black granules. During the first two years he lost " some kilos " in weight. He was treated with iodine and his condition fluctuated, now better, now worse. A photograph shows the present state of the lesions ; they are no longer painful nor itching, are often crusted over fistulous openings excreting blood stained serum. The fungus was cultivated on Sabouraud's medium and presented a black centre with pale periphery.

The patient was given iodides *per os* and by injection, but he evinced marked intolerance and this form of treatment had to be stopped. Radiotherapy benefited but did not cure ; vaccines were badly borne and gave rise to violent pain at the site of the lesions. Though improved, the lesions still persist and recently have remained stationary. The patient is to report again in 3–4 months. *H. H. S.*

LACAZ (Carlos da Silva). O iodo no tratamento das micoses. [**Iodine in the Treatment of Mycoses.**]—*Ann. Paulist. Med. e Cirurg.* 1940. May. Vol. 39. No. 5. pp. 379–399. [52 refs.] English summary.

This is a general account of mycoses and their treatment with iodine in various forms. By way of preliminary the author gives Floriano de Almeida's classification, followed by a score or so of formulae of iodine preparations, taking the mycoses in subgroups and noting their relative susceptibilities to the drug, and finally describes the symptoms which may be produced by iodine in those with an idiosyncrasy to iodine. *H. H. S.*

CARRIÓN (Arturo L.). Estudio micologico de un caso de micetoma por *Cephalosporium* en Puerto Rico. [**Mycological Study of a Case of Mycetoma associated with Cephalosporium in Porto Rico.**] —*Mycopathologia.* The Hague. 1940. Mar. 26. Vol. 2. No. 3. pp. 165–170. With 23 figs. on 2 plates.

This article gives a detailed account of an investigation into the causative fungus of the case referred to in this *Bulletin*, 1940, Vol. 37, p. 96, and the clinical aspects of which were reported by CARRASQUILLO in 1938. This species has certain affinities with three previously described as causative of human disease, namely *C. griseum* Gougerot, 1933 ; *C. recifei* Leão and Lobo, 1934 and *C. keratoplasticum* Morikawa, 1939. The present differs from all of these, but the author has not yet given it a name. *H. H. S.*

MOORE (Morris) & MAPOTHER (Paul). **Chromomycosis of the Face. Report of a Case and a Study of the Causative Organism,** *Phialophora verrucosa.*—*Arch. Dermat. & Syph.* 1940. Jan. Vol. 41. No. 1. pp. 42–54. With 4 figs. [24 refs.]

DE ALMEIDA (F.). Observações sobre culturas de *Paracoccidioides cerebriformis* Moore, 1935. Nota I. [**Notes on Cultures of** *Paracoccidioides cerebriformis* **Moore, 1935.**]—*Ann. Facul. de Med. Univ. de S. Paulo.* 1938. Vol. 14. pp. 235–245. With 3 plates (2 coloured). English summary.

A fungus cultivated from cases of blastomycosis in Brazil has been maintained at the Oswaldo Cruz Institute under the designation *Coccidioides histoporocellularis*. MOORE made a study of this and concluded that it belonged to the genus Paracoccidioides and [for reasons not mentioned in the present paper] gave it a new specific name, *cerebriformis*. In its growth it was observed to produce at times a red pigment which disappeared as the culture aged, and later cultures were white, and two different types of culture were produced : one, deeply furrowed, easily detachable from the medium (Sabouraud glucose) and readily dissociating ; the other, with larger folds covered with light down, more adherent to the medium. Both types may produce red pigmentation in the early days of cultivation. The coloured plates show the culture characters very clearly. *H. H. S.*

DE ALMEIDA (F.). Granuloma paracoccidioidico–Sua distribuição no Brasil e particularmente em São Paulo. [**The Distribution of Paracoccidioidal Granuloma in São Paulo, Brazil.**]—*Ann. Facul. de Med. Univ. de S. Paulo.* 1936. Vol. 12. No. 3. pp. 403–405. With 7 graphs.

The south American, Brazilian, form of fungus producing blastomycosis, *Paracoccidioides brasiliensis*, differs in many respects from the *Coccidioides immitis*, the cause of analogous lesions in north America. Morris MOORE on studying the latter condition found that there were two species, *Paracoccidioides brasiliensis* and another which he named *P. cerebriformis* [see above]. As regards distribution of cases, of 370 observed to the end of December, 1935, nearly two-thirds, 240 (65 per cent.) occurred in São Paulo ; Rio came next, but far behind, with between 30 and 40 [the graph is not very clear], 30 were not allocated, and the remaining 60–65 were divided among nine other States. Other graphs give the nationalities of those affected [as the relative populations by race are not stated, this graph conveys no useful information] ; the ages most affected were between 20 and 30 years, those between 40 and 50 next, and 30–40 years a close third ; 88 per cent. of the patients were males. The disease seems to be on the increase ; of late years there have been about 30 cases annually recorded in São Paulo alone. *H. H. S.*

LAMPE (P. H. J.). Over piedra en het vóórkomen van piedra te Batavia. [**Piedra in Batavia.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1940. June 18. Vol. 80. No. 25. pp. 1519–1525. With 12 figs. on 4 plates. English summary.

" Piedra with black nodules, caused by piedraia, is frequently met in the native population of Batavia ; 120 men and 66 women were examined out of whom 40 and 3 were infected, viz. 33 and 5 per cent. On the other hand, piedra with less coloured or white nodules, caused by trichosporum, seems very rare ; only one case was seen.

"No evidence was found of a direct transmission, but a high incidence was observed in men who take their baths in public waters and the same was true for the use of a certain hair-oil, locally made in a Chinese factory. Whether these coincidences are real and significant in connection with the cause or the manifestation of the disease is yet to be decided."

CATANEI (A.). Sur la répartition de différentes espèces de champignons des teignes de l'homme en Afrique. [**The Distribution of Pathogenic Skin Fungi in Africa.**]—*Arch. Inst. Pasteur d'Algérie.* 1939. Dec. Vol. 17. No. 4. pp. 613–624. [40 refs.]

PANJA (D.) & MAPLESTONE (P. A.). **A New Method of treating Leucoderma.**—*Indian Med. Gaz.* 1940. Feb. Vol. 75. No. 2. pp. 93–94. With 1 plate.

The oil extracted from seeds of *Psoralia corylifolia,* and known as *bouchi* oil has been used as an external application in leucoderma with occasional success. Recently, however, the authors used it by intradermal injection with excellent results. A single drop (0·05 to 0·1 cc.) is injected at each place and may be enough in the centre of an area only 1 cm. in diameter. For larger patches the authors advise that several injections be given at one time, but that they should not be too close together, the intervening areas being dealt with a few days later. The injections cause considerable pain and may even produce small ulcers which, if close together, may coalesce to form relatively large lesions. In two or three weeks pigment begins to form at the site of the needle puncture, from which point it spreads centrifugally, and this process occurs even if there has been ulceration. A series of excellent illustrations indicate the good results obtained, and it is stated that even in cases of long standing regeneration of pigment may be induced. The authors are now attempting to reduce the pain by the addition of various substances to the oil.

It is pointed out that in races with dark skins this condition is often regarded as leprosy and that affected persons are therefore unjustifiably shunned by their fellows. *C. W.*

LANDOR (J. V.). **Dermatitis Venenata from a Common Malayan Plant** —*Jl. Malaya Branch Brit. Med. Assoc.* 1940. Mar. Vol. 3 No. 4. pp. 384–386. With 3 figs.

The plant referred to is *Gynandropsis gynandra* or *G. pentaphylla,* known among Malays as maman puteh, maman hantu, or kemaman, and among Tamils as velai or thair-velai. It is used by some as a vegetable; it is a common Malayan weed whose sap contains an irritant oil which is destroyed by cooking. The crushed fresh leaves are used as a counter-irritant. In the instance here recorded the leaves were rubbed in the hands and applied to an axillary boil and a severe dermatitis soon followed. Patch test with the crushed leaves was strongly positive, with uncrushed leaf negative. The dermatitis soon cleared with rest and the application of a soothing lead lotion.

H. H. S.

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

Précis of Abstracts in this Section.

Relapsing fever.—Neilson (p. 96) reports a case of relapsing fever from Oklahoma.

Chung (p. 97) found spirochaetes morphologically indistinguishable from *S. recurrentis*, but motionless, in the urine of 27 patients (from a total of 41 examined) in whom spirochaetes were present in the blood. Six specimens were inoculated into squirrels and in one case relapsing fever was induced, showing that in this patient at least the spirochaetes were living and virulent.

Oag (p. 97) has found that if *S. duttoni* is inoculated into fowl embryo two or three days before hatching, infection is readily produced; spirochaetes are present in the blood of the chicks which emerge and may persist for 5 days. Normal chicks and adult fowls are immune to infection, but no reason has been found for the susceptibility of the embryos and the immunity of the hatched fowls. Hallauer and Kuhn (p. 97) have cultivated *Trypanosoma brucei* and *Spirochaeta recurrentis* in fowl embryos. With the latter, embryos which had been incubated for 9 to 12 days at the time of inoculation regularly died between the third and fifth days after inoculation.

Hopkins and Chorley (p. 98) have investigated the value of insecticides against *Ornithodorus moubata* in natural surroundings. Fumigation, even with HCN, is useless. A mixture of turpentine, alcohol, kerosene and soap was the most effective spray, but is expensive. Paradichlorbenzene in kerosene gives excellent results, although it cannot eradicate ticks from thatch; it is effective against bed bugs and cockroaches. For blanket and bedding the Carnie disinfestor, in which a temperature of 82°C. may be attained, is efficient.

Schuhardt (p. 99) has devised a receptacle for the propagation of spirochaete-infected *Ornithodorus turicata*.

Leptospirosis.—Esseveld *et al.* (p. 99) have examined a large number of animals in the Dutch East Indies and have found that rats form the most important reservoirs of leptospirosis, but that cats weighing over 1·5 kgm. are also considerably affected. The principal strains are *L. javanica* and *L. bataviae*, but in man the latter predominates. The presence of *L. canicola* infection in man has not yet, however, been excluded.

Rat-bite fever.—Diaz Atiles (p. 101) reports the third recorded case of rat-bite fever in Porto Rico, but suspects a higher incidence. The child was successfully treated with Stovarsol. *C. W.*

Neilson (W. P.). **Report of a Case of Relapsing Fever.**—*Jl. Amer. Med. Assoc.* 1940. July 13. Vol. 115. No. 2. pp. 125–126. With 1 fig.

A record of a typical case of relapsing fever in a patient from an Oklahoma farm. The origin of this infection is obscure since there was no history of insect bite or other external lesion, and the patient lived in the wheat plains area and did no outside work. No other cases were found in the neighbourhood. *E. Hindle.*

CHUNG (Huei-Lan). **Presence of *Spirochaeta recurrentis* in the Urine of Patients suffering from the Chinese Strain of Relapsing Fever.**—*Far Eastern Assoc. Trop. Med. C.-R. Dixième Congrès Hanoi, 26 Nov.–2 Dec., 1938.* Vol. 2. pp. 309–314.

More than ten years ago REMLINGER and BAILLY showed that the urine of guineapigs experimentally infected with *Sp. hispanica* might contain the organism during the height of the infection. In order to determine whether the same might hold good for human beings naturally infected with *Sp. recurrentis*, the author examined the urine, carefully collected, from 41 patients in whose blood the spirochaete was seen. Ten cc. of urine were centrifuged at 2,000–2,500 r.p.m. for 20 minutes, and all but 0·1–0·2 cc. pipetted off from the deposit, which latter was examined by dark field illumination. In 27 of the patients spirochaetes morphologically indistinguishable from *Sp. recurrentis* were seen, but they were motionless. In one case they were present in large numbers during the crisis, but not during the remission. Six specimens were inoculated into six squirrels; 4 died in 7–11 days apparently of septic pyogenic infection, one developed relapsing fever in 18 days. The question whether these urinary spirochaetes were merely saprophytes in the genitalia is considered, although morphologically they were indistinguishable from *Sp. recurrentis*; in one case certainly living and virulent relapsing fever spirochaetes were present. *H. H. S.*

OAG (R. Knight). **The Comparative Susceptibility of the Chick Embryo and the Chick to Infection with *Borrelia duttoni*.**—*Jl. Path. & Bact.* 1940. July. Vol. 51. No. 1. pp. 127–136. With 1 plate.

A continuation of the author's observations on the growth of *Spirochaeta duttoni* in fowl embryos and young chicks. [See this *Bulletin*, 1940, Vol. 37, p. 200.]

The developing fowl embryo is found to be extremely susceptible to infection with this spirochaete if inoculated 2 or 3 days before hatching, and the chicks which emerge show numerous spirochaetes in their blood which may persist for as long as 5 days after hatching.

Normal chicks, even newly hatched, as well as adult fowls are found to be solidly immune to infection with *S. duttoni* inoculated intravenously, subcutaneously or intraperitoneally. The whole blood and serum from mouse, fowl or fowl embryo are spirochaeticidal *in vitro*, possibly producing a direct lytic effect, but this property seems to be absent from the blood of the mouse and fowl embryo *in vivo*.

The temperature of the chick (40°C.), although higher than the optimum for a spirochaete normally parasitic in man and certain other mammals, seems to have no influence on resistance to *S. duttoni*.

No explanation of the difference in susceptibility of the fowl embryo and the young chick has yet been found. *E. H.*

HALLAUER (C.) & KUHN (H.). Ueber die Dauerzüchtung von Naganatrypanosomen und Rückfallfieberspirochäten im befruchteten Hühnerei. [**The Cultivation of Nagana Trypanosomes and Relapsing Fever Spirochaetes in Incubated Fowl Eggs.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1940. Apr. 7. Vol. 122. No. 4. pp. 406–411. With 5 figs.

Trypanosoma brucei and a European strain of *Spirochaeta recurrentis* were inoculated in the usual way into fowl's eggs that had been incubated 9 to 12 days.

The trypanosomes appeared in the blood within 2 to 3 days and usually caused the death of the embryo within 5 days. Subcultures into other eggs are best made on the 4th day and in this way the authors maintained the trypanosomes in eggs for 22 successive passages during a period of 2½ months. After 10 to 12 passages the trypanosomes regularly showed two distinct forms, one short and thick and the other long and slender. This dimorphism disappeared in later passages and also when the egg strain was inoculated into mice the typically monomorphic character of the trypanosome being restored. No alteration in virulence to mice and guineapigs was noted as a result of the egg passages.

The culture of a European strain of *Spirochaeta recurrentis* was effected in a similar manner in eggs that had been incubated for 9 to 12 days. Two to three days after being inoculated the blood of the embryos contained numerous spirochaetes and the embryos regularly died of the infection between the third and fifth days. The strain was maintained continuously in developing eggs for 35 passages extending over more than 4 months without any alteration in virulence being observed. *E. H.*

HOPKINS (G. H. E.) & CHORLEY (T. W.). **Experiments on the Destruction of Ticks.**—*East African Med. Jl.* 1940. May. Vol. 17. No. 2. pp. 71–80.

Fumigation by sulphur dioxide or HCN appeared to cause no inconvenience to *Ornithodorus moubata* even when the ticks were exposed in an open vessel to the gases. Experiments with sprays were therefore undertaken, the ticks being placed in Petri dishes, in cracks in model walls, or under natural surroundings in native prisons. Several substances showed some killing effect, including kerosene, formalin and turpentine, but only the latter was successful enough to warrant further trial. It was found that the diluents used, kerosene or alcohol, diminished the killing time of turpentine, but the addition of a little soap to such mixtures greatly increased the killing power. The final mixture selected consisted of 30 cc. turpentine, 50 cc. 25 per cent. alcohol, 5 cc. kerosene and a little white soap. This killed ticks in a few minutes, but was expensive and troublesome to make. Attention was therefore turned to a solution of 1½ lbs. paradichlorbenzene in 1 gallon kerosene, roughly filtered to avoid blocking of the jet of the sprayer. This gave excellent results with the Petri dishes and model walls. In actual buildings the results were good especially if ceilings were present—the spray cannot eradicate ticks from thatch. The amount used was about 12–14 gallons to 2,000 square feet of surface sprayed and the cost, exclusive of labour, was about 2*s.* 4½*d.* per gallon. It is pointed out that the spray should be fairly coarse and under considerable pressure; a fine mist is not successful. This spray is apparently effective against *Cimex hemiptera* and its eggs, and against cockroaches.

To kill ticks in blankets, bedding and clothing the Carnie disinfestor was found to be efficient. This consists of large open-mesh basket inverted over a small charcoal or dung fire; over this are placed the blankets, etc. and these in turn are covered by a still larger, close-mesh basket plastered with cow dung. In this a temperature of 82°C. may be reached, and the articles should be exposed for ½ hour.

C. W.

SCHUHARDT (V. T.). **A "Ticktorium" for the Propagation of a Colony of Infected** *Ornithodorus turicata.—Jl. Parasitology.* 1940. June. Vol. 26. No. 3. pp. 201–206. With 4 figs. on 1 plate.

A description of the construction and maintenance of a receptacle for the propagation of a spirochaete-infected colony of *Ornithodorus turicata*, and methods of exposing animals to infection.

A cave near Falls Creek, Texas, served as a source of these ticks for some years, but in 1936 an irrigation scheme on the Colorado River resulted in its inundation. Several hundred ticks were collected before this took place and since that time they have been successfully maintained in this housing device, for details of which the original article should be consulted. *E. H.*

ESSEVELD (H.), COLLIER (W. A.) & MOCHTAR (A.). **Leptospirosis in the Netherlands East Indies, with Special Reference to the Virus-reservoirs. (Report presented at the Sixth Pacific Science Congress, San Francisco 1939.)**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1940. Vol. 29. No. 1/2. pp. 1–9.

A useful study of leptospirosis in the Netherlands East Indies, based on the examination of more than 3,000 animals from Batavia and its neighbourhood, with special reference to determining the reservoirs of infection.

The animals were examined by making cultures from the kidneys and the results of tests of rodents and carnivora are shown in the table on the following page.

In addition 113 *Crocidura* sp. and 276 bats belonging to different species were examined with negative results.

It is evident from this table that rats of various species are the most important reservoirs. Of the strains from *Rattus rattus*, 165 were determined; serologically 164 belonged to *L. javanica* and only one to *L. bataviae*. Collier has extended the examination of these animals, mainly from the suburbs, and found about 50 per cent. infected. Out of 185 strains from Norwegian rats, 115 were identified; 100 belonged to the *bataviae*, and 15 to the *javanica* type.

It will be noticed that 116 cats weighing less than 1·5 kgm. were uniformly negative, but 13 strains were isolated from 233 cats above this weight. Seven of the strains belonged to the *bataviae* and 6 to the *javanica* type.

The various strains were tested serologically by means of various specific antisera against known types, and all the strains were found to be either *L. bataviae* or *L. javanica*. With a typical anti-Weil serum (Wijnberg) the *L. javanica* strains reacted slightly up to 1/250 dilution. Also a few slight coagglutinations were observed. Guinea-pigs inoculated with *L. bataviae* regularly became infected and died with symptoms of jaundice and haemorrhage. On the other hand guineapigs inoculated with *L. javanica* never showed any typical signs of disease, and although in one series some of them died the cause of death was uncertain.

Guineapigs occasionally showed *L. javanica* in the kidneys three weeks after inoculation, but white mice were found to be much more regular carriers of the infection.

Order	Species of animal	No. of animals examined	Media from the kidneys after 3 weeks		Percentage of leptospirae-carriers
			sterile	leptospirae	
Rodentia ...	*Rattus rattus brevicaudatus* Horst & de R. (field rat) ...	1,042	868	174	16·7
	Rattus rattus diardi Jent. (house rat) ...	66	64	2	3 ?
	Rattus rattus spec. ...	165	148	17	10·3
	Rattus norvegicus Erxl. (Norwegian rat) ...	15	6	9	(60)
	White tame rats from the Eijkman Institute	57	57	0	0
	Sciurus notatus notatus Bodd. (squirrel) ...	172	172	0	0
	Chiropodomys gliroides annae Thos. & Wr. (small coconut rat)	127	127	0	0
Carnivora...	*Felis domestica* L. (house cat) under 1·5 kg. body weight	116	116	0	0
	Felis domestica L. (house cat) over 1·5 kg. body weight	233	220	13	5·6
	Felis bengalensis javanensis Desm. (tiger cat)	6	6	0	
	Viverricula malaccensis rasse Horsf. ...	12	12	0	
	Paradoxurus hermaphroditus javanicus Horsf.	17	17	0	
	Herpestes javanicus javanicus Desm. ...	7	6	1	
	Lutra cinerea Illig. (common otter) ...	6	6	0	

The examination of 673 samples of human sera, mainly from the town of Batavia, against 5 strains of leptospira gave the following results :—

Type	No. of sera examined	Negative	Positive
L. bataviae	617	573	44 (7·1 per cent.)
L. javanica	468	464	4 (0·9 per cent.)
L. ict. haem.	617	617	0
" Rachmat "	501	499	2 (0·4 per cent.)
" Salinem "	223	223	0

It would seem from these results that *L. bataviae* and *L. javanica* are the two most important strains in Batavia, but the possibility of *L. canicola* being present has not yet been excluded. *E. H.*

DIAZ ATILES (Alberto). **Sodoku : its Present Status. Report of a Case ; Suggested Oral Treatment in Infants and Young Children.**—*Bol. Asoc. Med. de Puerto Rico.* 1940. Aug. Vol. 32. No. 8. pp. 293–302. With 2 figs. [18 refs.]

A general account of the disease followed by the report of a case in Porto Rico, in a 9 months old baby who had been bitten by a rat.

Spirilla were discovered in stained blood-smears of the patient and the organism was also recovered from the peritoneal fluid and blood of rats and guineapigs inoculated with the patient's blood. The clinical symptoms were typical and the case was treated successfully by oral doses of acetarsone (Stovarsol). There are only two previous records of the disease from Porto Rico, but under the existing living conditions the author suspects a higher incidence. *E. H.*

MALARIA.

PRÉCIS OF ABSTRACTS IN THIS SECTION.

HACKETT (p. 102) points out certain factors in the epidemiology of malaria about which more information, based possibly upon new techniques of investigation, is necessary.

From hospital figures it appears that there has been increased incidence of malaria in the Federated Malay States in recent years, and the Malaria Advisory Board (p. 102) attribute this in large measure to the replanting of rubber. Drug prophylaxis with plasmoquine was unsuccessful in one experiment, but in another M3 is being tried. Other measures of control are reported. ROBERTSON (p. 103) shows that malaria has become more prevalent in the province of Hunan as a result of movements of population occasioned by war conditions. *A. hyrcanus* var. *sinensis* and *A. minimus* are the principal vectors.

PAHATI (p. 104) discusses the malaria found in the island of Talim ; as there are no vectors all the cases were contracted on the adjoining mainland. AMBIALET (p. 104), from an investigation in Algeria, shows how disastrous may be the consequences of intense anophelism even when the local reservoir of malaria infection may appear to be negligibly small [see also TATE below].

AFRIDI *et al.* (p. 105) have studied adult *A. culicifacies* near Karnal in India.

HU (p. 105) shows that near Shanghai, *A. hyrcanus* var. *sinensis* is found much more frequently in animal sheds than in adjacent human habitations.

TATE (p. 105) relates how a dam in Alabama created a favourable breeding place for *A. quadrimaculatus* with the result that there occurred an epidemic of malaria in a neighbouring town. Oiling of the water edge failed to give protection but relief was given by atebrin prophylaxis. KOMP (p. 106) reports the finding of *A. darlingi* in British Honduras and Guatemala, far north of the places in which it has hitherto been seen. BOYD and JOBBINS (p. 106) found that *A. albimanus* from Panama was less susceptible to infection with strains of *P. falciparum* from Mexico or Florida than was *A. quadrimaculatus* from Florida.

CHUNG *et al.* (p. 106) describe 22 cases of subtertian malaria contracted from contaminated syringes or needles used for intravenous administration of heroin or morphine in Peiping. In performing the injection blood is drawn into the syringe and no attempt at sterilization is made. Tertian malaria is the type usually acquired in nature in this district.

NUCCIOTTI (p. 107) has developed a method of administering adrenalin (in the form of a preparation, Surrenasi, described in the abstract) together with quinine in the early stages of infection. The results are claimed to be good and the method is easier than the original Ascoli method.

In Malaya FIELD and NIVEN (p. 107), from a considerable series of experiments on immigrant Indian labourers, have found that in persons who have received prophylactic drugs, the incidence of malaria after the cessation of administration is very much higher than in untreated controls. This phenomenon is probably due to failure of the treated persons to acquire immunity during the period of drug prophylaxis. FARINAUD (p. 108) shows that in French Indo-China, if the breeding of the principal vectors is not controlled, drug prophylaxis cannot confer complete or lasting benefit, but if there is some premunition and some control of anophelines the synthetic drugs may be of great value. Quinacrine is the essential drug.

C. W.

HACKETT (L. W.). **Some Obscure Factors in the Epidemiology of Malaria.**—*Amer. Jl. Public Health.* 1940. June. Vol. 30. No. 6. pp. 589–594. Also in *Med. Officer.* 1940. Aug. 3. Vol. 64. No. 5. pp. 37–39.

The title of this paper defines its scope and intent. There are influences at work favouring or hindering malaria transmission of which little account is, or can be, taken in malaria surveys; new techniques are required. Such influences may upset calculations based on measurable factors. The relative susceptibility to malaria infection of anopheline vectors, the measure of the contact of the anopheline with man, and the life-span of the anopheline vector in its natural environment, are among the influences directly concerning the insect vector about which knowledge is required. With regard to the population at risk, group immunology, as determined by the multiplicity of malaria strains, and the possibility that gametocytes may appear in waves, in a large number of people simultaneously, in response to some natural external stimulus, are matters about which further knowledge is required.

Norman White.

FEDERATED MALAY STATES. **Annual Report of the Malaria Advisory Board for the Year 1939** [KINGSBURY (A. Neave), Chairman].—22 pp. With 4 charts. 1940. Kuala Lumpur: F.M.S. Govt. Press.

As in previous years, admissions to hospitals are the only data available for estimating malaria incidence. Such figures have obvious limitations. Hospital admissions for malaria in 1939 in the Federated Malay States numbered 49,700 as compared with 51,300 in 1938, 35,500 in 1937, and 27,200 in 1936. In 1938 all four States had escaped

the autumn wave and, probably as a result, the usual April–June wave in 1939 was less severe than in the previous year. Exceptionally high autumn waves developed, however, and accounted for the year's high total of cases: in Selangor and Pahang the autumn maxima exceeded those of May–June. Such heavy autumn waves have not been experienced for many years. Much of the increased incidence during the past three years is ascribed to the replanting of rubber [see also this *Bulletin*, 1940, Vol. 37, p. 454]: the acreage replanted in 1939 was twice that of the previous year. The case mortality rate remained stationary at 1·8 per cent., a satisfactory figure. There were 47 cases and 12 deaths ascribed to blackwater fever as compared with 37 and 9 in the previous year.

An attempt at plasmoquine prophylaxis was carried out on an isolated estate with a population of about 700. The administration of 0·02 gm. (adult dose) of plasmoquine, twice a week, was continued throughout a year. The attempt was not successful.

An attempt at prophylaxis with M.3, prepared in the State Biochemical Institute of Milan, is in progress: two and a half months after the commencement of treatment there was no appreciable reduction of malaria incidence in a group of persons so treated. [M.3 is manganese iodomercurate in association with spleen extract, see this *Bulletin*, 1938, Vol. 35, p. 31; and 1939, Vol. 36, p. 262.]

Field experiments with various anti-larval oils continue. On one estate rubber oil, distilled from scrap rubber, has been used as a larvicide, with success. Recent experience with fascine drainage has been very encouraging: the time of survival of the timber used for the packing is very long. Experiments have been carried out with automatic traps for adult mosquitoes: in one type of trap mosquitoes are drawn by suction against a wire gauze; in the other they are drawn through the fan into a killing bottle. For the lights, green-blue was found to be the best colour: red was unsatisfactory. The results were good with the former.

The report contains an interesting note on the haemoglobin percentage of rural Malay and Tamil children. Though malaria and helminthiasis both contribute to the low average haemoglobin, subnutrition is a most important factor in the causation of anaemia.

N. W.

ROBERTSON (R. Cecil). **Malaria in Hunan Province.**—*Far Eastern Assoc. Trop. Med. C.-R. Dixième Congrès Hanoi, 26 Nov.–2 Dec., 1938.* Vol. 2. pp. 917–940.

This malaria survey of parts of Hunan was carried out as a prelude to repopulating the region with refugee farmers from other parts of China. Malaria does not appear to have been a serious cause of morbidity or death until comparatively recently. Communist incursions during the civil war brought with them strains of malaria infections, as did subsequently labour gangs employed on the construction of new highways and railroads. Still more important are the migrations of the civil population and the passage of troops from every province occasioned by the war with Japan. The author anticipates an increasing epidemicity of malaria in this and many other parts of China: his report shows the disease to be firmly entrenched as an endemic in those parts of the province he has studied.

In the north-east corner of Hunan 914 blood films were examined: malaria parasites were found in 63; 40 of these contained *P. malariae,*

and 15 *P. vivax*. Further south *P. falciparum* is most in evidence. *A. hyrcanus* var. *sinensis* is the most prevalent anopheline and almost certainly the most important vector. In south-western Hunan *A. minimus* and *A. maculatus* were found in hilly regions: the former here plays an important part in the spread of malaria. *A. lindesayi* was also found but it was rare. *N. W.*

PAHATI (Amador P.). **The Epidemiology of Malaria in a Non-Malarious Barrio of Talim Island.**—*Acta Med. Philippina.* Manila. 1939. July–Sept. Vol. 1. No. 1. pp. 37–46. With 2 maps & 1 chart.

Talim Island, a small island in Laguna Bay, is non-malarious: no malaria vectors have been found there. The *barrio* of Talim is on the southern tip of the island; it has a population of 913. During the latter half of 1938 there were 199 cases of benign tertian malaria. The victims had all contracted infection on the adjacent mainland where they were engaged in seasonal agricultural pursuits. The part of Rizal Province where infection was contracted is not usually malarious though *A. minimus* var. *flavirostris* is prevalent: in 1938 the visit of malaria carriers from Laguna Province introduced infection.

N. W.

AMBIALET (R.). Quelques observations parasitologiques sur une épidémie de paludisme (R'Oufi, Département de Constantine, septembre 1938). **Parasitological Observations on an Epidemic of Malaria in R'Oufi, Department of Constantine, Algeria, in September 1938.**]—*Arch. Inst. Pasteur d'Algérie.* 1940. Mar. Vol. 18. No. 1. pp. 19–26.

R'Oufi was the scene of comparative experiments in mass prophylaxis by means of quinine and of synthetic drugs that were carried out in 1934–36 [see this *Bulletin*, 1938, Vol. 35, pp. 422–424]. Malaria in R'Oufi is dependent upon the vagaries of the Oued el Abiodh and the value of the observations on mass prophylaxis was somewhat vitiated by the fact that there were practically no anophelines and no malaria transmission during the whole period of the observations. There were residual infections whose evolutions were the subject of an interesting study. In 1938 a severe epidemic of malaria afflicted R'Oufi. The author passing through the place in September of that year took the opportunity of examining the blood of all the children of one village and of some children and adults met on the road. The number of persons so examined was 44 and the results of this examination are recorded. The parasite index of this small group was 65·9 per cent. as contrasted with 0·72 in May 1936 at the completion of the prophylaxis experiment. *P. falciparum* was proportionally much more prevalent than it had been during the previous observations, and the increase in the proportion of the infected persons who were gametocyte carriers was very much greater in the case of *P. falciparum* than of *P. vivax* and of *P. malariae* infections. The observations illustrate the disastrous consequences of intense anophelism even when the local reservoir of malaria infection may appear to be negligibly small. *N. W.*

COLLIGNON (E.). Remarques sur le comportement des anophèles en Algérie pendant l'année 1939. [**Anopheles in Algeria in 1939.**]—*Arch. Inst. Pasteur d'Algérie.* 1940. Mar. Vol. 18. No. 1. pp. 29–37. With 8 figs. on 4 plates.

AFRIDI (M. K.) & PURI (I. M.). **Studies on the Behaviour of Adult** *Anopheles culicifacies.* **Part I. Review of Literature.**—*Jl. Malaria Inst. of India.* 1940. June. Vol. 3. No. 1. pp. 1–22. With 1 plate. [116 refs.]

——, MAJID (Abdul) & SHAH (Imdad Ali). **Studies on the Behaviour of Adult** *Anopheles culicifacies.* **Part II.**—*Ibid.* pp. 23–51. With 1 map & 5 charts. [16 refs.]

In the first paper the authors summarize existing knowledge about this mosquito. They appear to have gathered together all that is known about its seasonal prevalence, resting and feeding habits, hibernation and aestivation, longevity and range of flight. This paper will be a most useful foundation for future work.

In the second paper the authors describe their own work carried out near Karnal. The area was conveniently accessible but was open to one objection, that larvae were continually drifting in down a canal, so that the population under study is not by any means a simple one. The main objects of the study have been the relative numbers of adults at different seasons, and the proportions of young and aged adults.

The authors have made use of simple methods of observation and have carried out relatively few experiments. They publish their data fully, for which the reader may be grateful, for he is provided with a large amount of original material from which to draw his own conclusions. At the same time it might be felt that the men most likely to draw useful conclusions are those who did the work, and that perhaps the authors should have been bolder in stating their own views.

P. A. Buxton.

HU (S. M. K.). **Observations on the Zoophilism of** *Anopheles hyrcanus* **var.** *sinensis* **Wied. in the Shanghai Region.**—*Far Eastern Assoc. Trop. Med. C.-R. Dixième Congrès Hanoi, 26 Nov.–2 Dec., 1938.* Vol. 2. pp. 873–888. With 6 figs. on 3 plates & 2 diagrams.

Observations made in 1934–35 in the Kaochiao district near Shanghai are recorded in detail. They show that *A. hyrcanus* var. *sinensis*, the local malaria vector, is found in very much greater numbers in cow sheds, pigsties and goat stables than in adjacent human habitations [see TOUMANOFF & HU, this *Bulletin*, 1935, Vol. 32, p. 437 and 1936, Vol. 33, p. 849; and TOUMANOFF & CANET, this *Bulletin*, 1940, Vol. 37, p. 860].

N. W.

TATE (Guy M.). **Controlling a Malaria Epidemic at Maxine, Ala.**—*Amer. Jl. Public Health.* 1940. June. Vol. 30. No. 6. pp. 675–679.

This is an account of a malaria epidemic in a community of about 240 persons, resulting from the heightening of a dam to secure a deeper channel for navigation. As a result the Coal Creek area, about 40 acres in extent, is submerged, the depth of water varying from a few inches to several feet; it is covered with vegetation. It

is now a prolific breeding place for *A. quadrimaculatus*. Spraying parts of the shoreline with oil failed to protect the nearby community of Maxine; a severe epidemic of tertian malaria ensued. The prophylactic issue of atebrin, twice a week from June 15 to Sept. 7, gave relief; clinical cases during this period were few. Adults received 0·2 gm. twice weekly; smaller doses were given to children. A month after the cessation of treatment only 2·6 per cent. of blood smears harboured parasites. *N. W.*

VARGAS (Luis). Clave para identificar las hembras de Anopheles Mexicanos. [**Key to the Female Mexican Anopheles.**]—*Rev. Inst. de Salubridad y Enfermedad Trop.* Mexico. 1940. May. Vol. 1. No. 2. pp. 199–203.

KOMP (W. H. W.). **The Occurrence of *Anopheles darlingi* Root in British Honduras and Guatemala.**—*Public Health Rep.* 1940. Apr. 19. Vol. 55. No. 16. pp. 693–694. Also in *Science*. 1940. May 31. Vol. 91. No. 2370. pp. 522–523.

A. darlingi, a very potent malaria vector in Brazil, has hitherto not been found north of British Guiana and Venezuela. The author now reports the finding of larvae and pupae of this species in pools alongside a creek in British Honduras. Adults were also captured in bed-nets of the camp personnel; none were captured with horse bait. Six adult female *A. darlingi* have also been found among a collection of mosquitoes from Guatemala: these were caught at Panzos, a town some 80 miles west of Puerto Barrios on the Atlantic coast of Guatemala. The finding of this species so far north of its usual range of distribution is of interest. *N. W.*

BOYD (Mark F.) & JOBBINS (Daniel M.). **Further Observations on the Comparative Susceptibility of Nearctic and Neotropical Anophelines to Coindigenous Strains of *Plasmodium falciparum*.**—*Amer. Jl. Trop. Med.* 1940. May. Vol. 20. No. 3. pp. 423–429.

Previous work on this subject by Boyd and his colleagues has been noted in this *Bulletin* [1938, Vol. 35, p. 659, 1940, Vol. 37, p. 288]. The observations now recorded are essentially similar. *A. albimanus* from Panama has been compared with a Florida strain of *A. quadrimaculatus* with regard to susceptibility to infection with strains of *P. falciparum* coming from Florida, Mexico and Panama respectively. *A. albimanus* is definitely less susceptible to infection with strains from Mexico and Florida than is *A. quadrimaculatus*. The relative susceptibilities of the two Anopheles strains to infection with *P. falciparum* from Panama present no significant difference. *N. W.*

CHUNG (Huei Lan), CHU (Irving) & WANG (C. W.). **Syringe Transmission of Subtertian Malaria among Narcotic Addicts in Peiping. (A Résumé of 22 Epidemic Cases.)**—*Far Eastern Assoc. Trop. Med. C.-R. Dixième Congrès, Hanoi, 26 Nov.–2 Dec., 1938.* Vol. 2. pp. 913–916.

Between November, 1937 and April, 1938, a mosquito-free season in Peiping, 24 patients suffering from malaria were seen in the Union

Medical College Hospital in that city. Of these, two were suffering from relapses of tertian malaria; the remaining 22 were subtertian infections contracted almost certainly by means of contaminated syringes and needles used for the intravenous injections of heroin or morphine. Tertian malaria is the most common form of the disease naturally acquired in Peiping; during the period in question no fresh infections of tertian malaria were seen. Twenty-one of the patients were natives of Hopei in which province naturally acquired subtertian malaria is very rare; 18 had never been outside this province. All 22 patients were narcotic drug addicts who had been receiving from 2 to 5 intravenous injections of heroin or of morphine daily. In the narcotic dens incriminated no attempts at cleaning the syringe or needle were made after their use, before a subsequent addict received his injection. In making the injection about half a cc. of the victim's blood was drawn into the syringe containing the narcotic solution and blood and solution were then injected together. In all these cases the malaria infections were very severe: all but one suffered from severe anaemia. One patient died: in the others quinine, sometimes associated with plasmoquine, suppressed the malaria. [See also this *Bulletin*, 1935, Vol. 32, pp. 108, 109 (list of other references given), 405; 1937, Vol. 34, p. 174; 1939, Vol. 36, p. 10.]

N. W.

NUCCIOTTI (Leonello). Azione della terapia adrenalinica in dosi minime uniformi nella malaria recente. [**Adrenalin in Small Doses in Recently Acquired Malaria.**]—*Policlinico.* Sez. Prat. 1940. May 20. Vol. 47. No. 20. pp. 854, 857–8, 861.

The author is impressed by the benefits conferred by associating Ascoli's adrenalin treatment with the administration of quinine in the treatment of recently acquired malaria, with respect to the marked improvement in the patient's general condition and to the diminished number of relapses that result from such association. He accordingly tried to evolve a method of administering adrenalin easier of application on a large scale than is Ascoli's method with its progressively increasing dosage. He has found that the intravenous injection of 1/100 mgm. of "Surrenasi" [apparently an extract of whole adrenal gland containing adrenalin, cortical hormone and Vitamin C] daily for six days, followed by the daily injection of 1/50 mgm. for the succeeding six days, and associated with quinine treatment is even more effective than is Ascoli's complete method in recently acquired infections. The total amount of adrenalin given is only 0·18 mgm., which is little more than a tenth of the amount given in Ascoli's complete course of treatment.

N. W.

FIELD (J. W.) & NIVEN (J. C.). **Malarial Chemoprophylaxis. Field Observations on Post Prophylactic Epidemicity.**—*Far Eastern Assoc. Trop. Med. C.-R. Dixième Congrès, Hanoi, 26 Nov.–2 Dec., 1938.* Vol. 2. pp. 959–993. With 11 graphs & 3 diagrams.

The authors, in association with HODGKIN, have previously reported the results of field experiments carried out in plantations in Selangor, Malaya, on the value of atebrin and quinine as clinical prophylactics

of malaria [see this *Bulletin*, 1938, Vol. 35, p. 36]. In that report attention was directed to the rapid reappearance of clinical malaria which followed the suspension of the administration of the prophylactic drugs. The present report is concerned exclusively with this phenomenon. The seven experiments described were made on 2,500 immigrant Indian labourers who were observed continuously for varying periods up to three years. In all seven experiments the post-prophylactic malaria incidence among those who had received the drugs was very much higher than the incidence among untreated controls ; in five experiments the incidence during the month following the cessation of treatment in the treated group was more than double that in the control group. The administration of the drugs was stopped at different times of the year, in some experiments during a season of normally slight transmission, when sporozoite rates were low.

These post-prophylactic cases were either delayed primary attacks from infections contracted during prophylaxis or else infections contracted twelve months, or more, previously that had been kept latent by the administration of drugs. The severity of these post-prophylactic cases, as gauged by the concentration of parasites in the peripheral blood, was no greater than that of cases occurring concurrently among the control groups. The populations concerned were not static, and the post-prophylactic rise in malaria incidence was almost limited to unsalted newcomers. It is probable, therefore, that the rise is a phenomenon related to lack of acquired immunity, and that effective chemoprophylaxis, continued for twelve months under conditions of hyperendemic malaria, is not consistent with the acquisition during this period of any effective malarial immunity.

N. W.

FARINAUD (M. E.). La prophylaxie du paludisme par les médicaments synthétiques en Indochine. [**Prevention of Malaria with Synthetic Drugs in Indo-China.**]—*Far Eastern Assoc. Trop. Med. C.-R. Dixième Congrès, Hanoi, 26 Nov.–2 Dec., 1938.* Vol. 2. pp. 995–1014. With 7 charts.

In this paper the author summarizes the lessons learnt from the very numerous attempts that have been made, in varied conditions, to control malaria by the administration of synthetic drugs in French Indo-China. Most, if not all, of these attempts have been described in the literature and the results summarized in this *Bulletin*. It has been found that if the breeding of the principal vectors, notably *A. minimus*, is not controlled, either naturally or by antilarval measures, in hyperendemic areas, chemoprophylaxis cannot confer complete or lasting benefit. If, however, the population concerned possess a certain degree of premunition, or if the anopheline density be reduced, either naturally or as the result of antimosquito measures, the prophylactic administration of synthetic drugs may give results of great value. It is the best method of dealing with sudden increases in malaria morbidity in areas of sporadic or epidemic malaria. Quinacrine is the essential element of this prophylactic treatment ; the addition of gametocides does not add appreciably to its efficacy. *N. W.*

HELMINTHIASIS.

Précis of Abstracts in this Section.

General.—Taliaferro (p. 110) has reviewed modern knowledge of immunity to parasitic worms, and concludes that it is essentially similar to that provoked by other infections and by non-infectious antigenic agents.

Cestodes.—Haight and Alexander (p. 111) record two cases of hydatid cyst of the lungs in the United States. Williams (p. 111) reports the first instance of infection with *Echinococcus granulosus* in a dog in the Szechwan province of W. China.

Uslenghi (p. 111) writes of the perivesicular air sac in the X-ray diagnosis of hydatid cyst of the lung. Rose and Culbertson (p. 111) show that readily available antigens may successfully be substituted for hydatid fluid in the cutaneous test or the complement fixation reaction for the diagnosis of hydatid disease. The antigens used were from *Cysticercus pisiformis* in the rabbit and from *Taenia taeniaeformis* in the cat.

Finochietto & Aguilar (p. 112) report the operation of Posadas in hydatid cyst of the lung.

Hsü (p. 112) reports acute encaphalitis as a result of cerebral cysticercosis. Dollfus (p. 112) names 8 species of Raillietina from man in tropical America. Bonne and Mreyen (p. 112) describe *Raillietina madagascarensis.* The cestode was found in a boy living in Batavia and this is the first occasion on which it has been found in the Malayan archipelago. Joyeux and Baer (p. 113) consider that *Raillietina quitensis* should be regarded as a synonym of *R. demarariensis.*

Stunkard (p. 113) shows that mites are intermediate hosts of species of Bertiella.

Kourí and Rappaport (p. 113) record 18 cases of infection with a species of *Inermicapsifer* in Cuba. All occurred in children and were easily eradicated. A description of the cestode is given.

Nematodes.—Maplestone and Mukerji (p. 114) have compared thymol with tetrachlorethylene as an anthelmintic. They argue that the latter used in doses of 4 cc. is safe and more efficient than thymol used in doses below 60 grains. Lane (p. 114), however, considers that thymol is the safest of all anthelmintics and may be used without fear in 60 grain doses in men, though the dose may be reduced in women. He discusses the question and urges the need for re-examination of the whole matter.

Hahn *et al.* (p. 116) show that in anaemic dogs the percentage of iron absorbed decreases as the amount administered is raised, but in comment Lane points out that it is the total amount absorbed, and not the proportion, which matters, and shows that with the larger doses the amount absorbed is greater than with the smaller doses.

Bussmann (p. 117) points out the danger of introducing workers infected with hookworm into the German mining industry.

Galliard (p. 117) considers that human infection with Strongyloides in Tonking may be more common than is suspected. He states that present methods are ineffective in the diagnosis of infection with Strongyloides and points out that when dogs are infected, the larvae may be found in large numbers in the duodenum, but may be absent from the stools, indicating digestion in the alimentary tract. Lane suggests the use of a duodenal tube in diagnosis in man.

GALLIARD (p. 117) shows that in Tonking, infection of dogs and cats with Strongyloides is not common, probably because exposure is restricted. Worms from human sources, which have both direct and indirect cycles in man, show only the indirect cycle in the dog. FAUST & DE GROAT (p. 118) record the case of a boy who died as a result of a heavy infection. There was a relatively heavy invasion of the deeper layers of the bowel wall and liver by filariform larvae derived from mother worms situated in the overlying mucosa. Auto-infection by various routes is discussed and it is concluded that all infected persons are potential subjects of self-infection which, however, may be to some extent controlled by measures of personal hygiene.

HSÜ *et al.* (p. 118) report two cases of heavy infection with Ascaris. PENEY (p. 119) reports a case of meningitis which he claims to have been due to infection with Ascaris. BERGER and ASENJO (p. 119) show that crystalline papain in adequate strength and over an adequate period of time digests *A. lumbricoides in vitro.* *C. W.*

TALIAFERRO (William H.). **The Mechanism of Acquired Immunity in Infections with Parasitic Worms.**—*Physiol. Rev.* 1940. Oct. Vol. 20. No. 4. pp. 469–492. [122 refs.]

"The foregoing review of acquired immunity to the helminths is not intended to be complete, but it is designed to indicate, in the few forms that have been most thoroughly studied, the facts that have been established and the more important ideas and differences in opinion of various investigators in an actively progressing field. As has been stressed by the reviewer (1934) and others, all evidence indicates that the various immunological mechanisms operative against the helminths, both humoral and cellular, are fundamentally identical with those operative against other infectious and noninfectious antigenic agents. Therefore the worms will undoubtedly be used with increasing frequency to solve those general problems in immunology for which they are best suited. Their chief advantages are connected with their large size, which makes it possible: (1) to study directly the effects of the immune mechanisms on the parasite and on parasitic metabolism; (2) to trace and locate the worms in the body, a characteristic which is particularly helpful in studying the immune mechanism *in vivo* and the cellular reactions of the host; and (3) to obtain large quantities of material, especially from the larger worms, for the preparation of antigens and for such chemical studies as the isolation of carbohydrates and enzymes.

"In the specific field of helminth immunity, the following points are noteworthy: The evidence so far indicates that the mechanism of immunity rests immediately on humoral factors with secondary cellular coöperation. Precipitins, which are formed by the host against various materials passing out of the mouth, anus and excretory pore of the intestinal nematodes, result in visible precipitates *in vivo* and are unquestionably of functional importance in the allergic reactions of the host. It is probable, but not proven, that the precipitins are instrumental in affecting the immobilization, delay in development, stunting, prevention of food assimilation and inhibition of enzymatic activity of the parasite. In any case, humoral factors of some kind are operative. Two types of immunity, one "early" and the other "late," have been demonstrated in infections with larval tapeworms. Both can be correlated with antibodies, but whereas the antibodies of the "early" type can be absorbed with freshly ground worm material, the others cannot. Further work is necessary on the nature of the antigens to the nonabsorbable antibodies, but evidence to date indicates that they are materials liberated from the living parasite and occur, if at all, in insufficient quantities in freshly ground worm material. The nature of the enzymes of parasites and the possibility

of the functional inhibition of enzymatic activity by immunological antienzymes needs further study. The evidence so far indicates that the cellular responses, aside from their activity in producing antibodies, are secondary to antibody effects. The worm infections offer advantageous material for studying the local cellular reactions around parasites. They may also be used to study the effect of various factors, such as splenectomy and blockade of the macrophage system, which injure the connective tissue cells and thereby affect the cellular coöperation in immunity and the formation of antibodies."

HAIGHT (Cameron) & ALEXANDER (John). **Hydatid Cysts of the Lung.**—*Arch. Intern. Med.* 1940. Mar. Vol. 65. No. 3. pp. 510–523. With 6 figs. [17 refs.]

"Two cases of echinococcus disease of the lungs are presented, and the nativity of the patients in the 46 cases of hydatid disease of the lungs and pleura reported in the North American literature is reviewed. The disease has occurred in only 5 persons known to have been born in North America."

The authors quote the following personal communications from Benjamin SCHWARTZ, Chief of the Zoological Division, U.S. Bureau of Animal Industry.

"During the fiscal year ended June 30, 1936, 1,513 cattle livers and 21 calf livers were condemned on account of infestation with Echinococcus. Echinococcus infestation is not rare in swine in certain sections of the United States, particularly in the South. We have no difficulty in securing such material from abattoirs in Richmond, Va. We have been informed recently that Echinococcus in the liver of swine is fairly common in abattoirs in Nashville, Tenn."

WILLIAMS (T. H.). *Echinococcus granulosus* **in Szechwan.**—*Chinese Med. Jl.* 1940. Feb. Vol. 57. No. 2. pp. 176–178.

What is held to be the first report of *Echinococcus granulosus* in dog from Szechwan province of West China is here recorded. The dog appears to have been one of four examined; eleven worms were found in it. *Clayton Lane.*

USLENGHI (José P.). Diagnóstico radiológico de los quistes hidatídicos del pulmón. A propósito del signo llamado "neumoquiste perivesicular." [**X-ray Diagnosis of Hydatid Cysts of the Lung with Reference to the Sign called Perivesicular Air Sac.**]—*Prensa Méd. Argentina.* 1940. Mar. 6. Vol. 27. No. 10. pp. 489–508. With 13 figs. [88 refs.]

The condition referred to is that in which air enters between the cyst wall proper and the adventitia. The matter of pulmonary hydatid is fully dealt with historically, and the description of a case under Professor GOYENNA is given in detail with excellent X-ray plates. *C. L.*

ROSE (Harry M.) & CULBERTSON (James T.). **The Diagnosis of Echinococcus (Hydatid) Disease by Immunologic Reactions with Substitute Taenia Antigens.**—*Jl. Amer. Med. Assoc.* 1940. Aug. 24. Vol. 115. No. 8. pp. 594–598. With 1 fig. [17 refs.]

The antigens were made from *Cysticercus pisiformis* from the rabbit, the larval form of *Taenia serrata*, and from adult *T. taeniaeformis* from cats.

"1. Cutaneous tests with substitute antigens were performed on fourteen patients with echinococcus disease. Complement fixation tests were made on seven patients.

"2. The group specificity of the Casoni and the Ghedini-Weinberg reactions was confirmed.

"3. Readily available antigens may be substituted for hydatid fluid in either the cutaneous test or the complement fixation reaction for the diagnosis of hydatid disease." *C. L.*

FINOCHIETTO (Ricardo) & AGUILAR (Hernan D.). Quiste hidatídico de pulmón; pleura libre. Operación de Posadas. [**Hydatid Cyst of the Lung, the Pleura being without Adhesions. The Operation of Posadas.**]—*Prensa Méd. Argentina.* 1940. Mar. 27. Vol. 27. No. 13. pp. 654–657. With 6 figs.

The plastic operation of Posadas was done under local anaesthesia for a cyst in the middle lobe of the right lung. The Casoni reaction had been negative and there had been no eosinophilia. The operative pneumothorax, as X-ray plates show, had disappeared 12 days later.

C. L.

HSÜ (Y. K.). **Cerebral Cysticercosis and Acute Poliomyeloencephalitis.** —*Chinese Med. Jl.* 1940. Apr. Vol. 57. No. 4. pp. 318–329. With 8 figs. on 4 plates. [21 refs.]

At the Peiping Union Medical College, *Cysticercus cellulosae* was present in the brain of 17 of 40 patients in whom the infection was detected, with epilepsy as a frequent clinical manifestation. In the case here reported there was also acute encephalitis with a diffuse inflammation throughout the central nervous system and softenings attributed to functional circulatory disturbances. *C. L.*

DOLLFUS (Robert Ph.). Cestodes du genre *Raillietina* trouvés chez l'homme en Amérique intertropicale. [**Raillietina in Man in Tropical America.**]—*Ann. Parasit. Humaine et Comparée.* 1939–1940. Vol. 17. Nos. 5 & 6. pp. 415–442; 542–562. With 35 figs. [27 refs.]

No species of Raillietina is known from wild or domestic mammals in tropical America. Dollfus arranges the specimens from man in 8 species, giving their characters. They are *R.* (*Raillietina*) *lochesalavezi* n. sp., *R. demarariensis* (Daniels), *R.* (*R.*) *kouridovali* n. sp., *R.* (*R.*) *equatoriensis* Dollfus, *R.* (*R.*) *quitensis* León, *R.* (*Fuhrmannetta*) *leoni* Dollfus, *R.* (*R.*) *brumpti* Dollfus and *R.* (*R.*) *luisaleóni* Dollfus.

C. L.

BONNE (C.) & MREYEN (F. W.). Over *Raillietina madagascarensis* (Davaine 1869). *Taenia madagascarensis* Davaine 1869, *Davainea madagascarensis* Blanchard 1891, *Kotlania madagascarensis* Lopez Neyra 1931.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1940. May 21. Vol. 80. No. 21. pp. 1310–1318. With 7 figs. on 2 plates. English summary.

"Description of 5 specimens of Raillietina madagascarensis (DAVAINE 1869), found at a post-mortem of a Chinese boy, 3½ years old, living at Batavia, Java. This cestode has never before been observed in the

Malayan Archipelago or at least not been recognized. No special clue with regard to the mode of infection could be discovered. Measures of certain details are tabulated and compared with those of other specimens. The rostellum was invaginated, its hooks very distinct. The suckers showed no rows of fine hooks, only a fine radially directed peripheral ridging. Segmentation starts 2 mm. from the row of hooks. The segments are at first trapezium-shaped and much wider than long, but the ripe ones become barrel shaped and much longer than wide. The genital pore is almost constantly unilateral, but may change to the other side after 50–150 unilateral positions. Its position is in the anterior third of the segment. The cirrhus-pouch does not reach the excretory system. The receptaculum seminis is very variable in shape and seems to be nothing but a passive widening of the vagina. In the stools of the other members of the child's family (father, mother, 3 young children) Raillietina eggs could not be discovered."

JOYEUX (Ch.) & BAER (Jean G.). Anatomía y posición sistemática de *Raillietina* (*Raillietina*) *quitensis* León, 1935, cestode parásito del hombre. [**Systematic Position of** *R. quitensis*.]—*Rev. Med. Trop. y Parasit.* Habana. 1940. Mar.–Apr. Vol. 6. No. 2. pp. 79–88. With 3 figs. [13 refs.]

Examination of abundant material showed variations among individuals of the same species of *Raillietina*. Accordingly *R. quitensis* Léon, 1935 [this *Bulletin*, 1939, Vol. 36, p. 720], is made a synonym of *R. demarariensis* (Daniels, 1895) as are the various forms described by DOLLFUS [this *Bulletin*, 1940, Vol. 37, p. 214]. *C. L.*

STUNKARD (Horace W.). **The Morphology and Life History of the Cestode,** *Bertiella studeri*.—*Amer. Jl. Trop. Med.* 1940. Mar. Vol. 20. No. 2. pp. 305–333. With 17 figs. on 3 plates. [24 refs.]

Bertiella species, as do those of *Moniezia* and *Cittotaenia*, utilize free-living mites as intermediate hosts, for onchospheres and developing larvae were recovered from the body cavities of the mites *Notaspis coleoptratus*, *Scutovertex minutus*, *Scheloribates laevigatus* and *Galumna* sp., and cysticercoids from *S. laevigatus* and *Galumna* sp. *C. L.*

KOURÍ (Pedro), with the collaboration of Irving RAPPAPORT. **A New Human Helminthic Infection in Cuba.**—*Jl. Parasitology.* 1940. June. Vol. 26. No. 3. pp. 179–181. With 8 figs.

Since 1935 the authors have found in Cuba 18 human infections with a species of *Inermicapsifer* Janicki, 1910 identified by Professor BAER. It has occurred in children only, has caused slight or no symptoms, has been detected by passage in the faeces of proglottids which are apt to migrate to the surface of the mass. In one child segments had, the mother said, been expelled continuously for six years except for an interruption of four months. The worm is easily expelled by male fern, by carbon tetrachloride, or even by coconut oil. BAER and STUNKARD suggest the rat as the optimum host, but Kourí and Rappaport have found none in 100 rats. Its description is as follows :—

"It is 27–42 cm. long, possessing 310–368 proglottids. The scolex measures about 630 micra long by 610 micra broad. The suckers are about 185 micra in the broadest diameter and 150 micra deep. The neck

is roughly 3 mm. long. The proglottids in the midportion of the strobila are broader than long, approximately 2·3 by 1·5 mm. Gravid proglottids expelled in the feces measure from 3 to 3·75 mm. in length, by 1 to 2 mm. in breadth. In the living motile condition, one of the poles of the freed proglottid is often broader, thus giving the segment a club shaped appearance.

"Genital pores are unilateral and in the center of the margin of each mature proglottid. The cirrus pouch measures about 150 micra long by 75 micra broad. The pouch is small and runs centrally and somewhat anteriorly. The vas deferens is long and coiled both without and within the cirrus pouch. The cirrus is often seen projecting from the genital pore. Testes number from 33 to 49 per segment, the antiporal side possessing, in general, about 5 more testes than the poral side, due to the presence of the vagina and vas deferens in the latter side. The testes average 65 by 72 micra. Gravid segments contain between 48 and 175 egg capsules. These capsules are very variable in size and shape. Each contains from 6 to 11 ova. These eggs are 55 by 49 micra and contain a small hexacanth embryo, 22 by 19 micra. Hooklets of the embryo are about 6 micra long." *C. L.*

i. Maplestone (P. A.) & Mukerji (A. K.). **Comparison of Thymol and Some Other Drugs in the Treatment of Hookworm Infection.**—*Indian Med. Gaz.* 1940. Apr. Vol. 75. No. 4. pp. 193–200. With 2 graphs.

ii. Lane (Clayton). **Thymol as an Anthelminthic.**—*Lancet.* 1940. Sept. 14. p. 349.

i. "In assessing our results it may be argued that we did not use 60 grains of thymol in a single case whereas we did use 4 c.cm. of tetrachlorethylene without exception. The reason we reduced the dose of thymol was not to decry its value but we were guided by the opinion of Ashford (than whom none had wider experience in its use) that for safety the dose of thymol must be carefully regulated. We were dealing with adults, but their weight was so much below the usually-accepted normal of 150 pounds that they had to be regarded as under age from the point of view of therapeutics, because this method of calculating dosage is now recognized as much more scientific than to use age in years, particularly in illiterate persons whose statement of their ages is often most unreliable. With regard to tetrachlorethylene we had our own experience of many years' use of the drug on human beings as well as our pharmacological work on cats which showed that the dose of 4 c.cm. is so far below the dangerous limit that it is not necessary to reduce the dose in adults however low their weight may be. In addition to our own experience a good deal of other evidence of the safety of tetrachlorethylene has now accumulated and so far the only case reported of its apparent dangerous toxic effects is that of Kendrick (1929) in which the serious symptoms rapidly passed off. As it is now over ten years ago since this isolated case was reported and no similar ones have since been recorded it seems reasonable to look on it as unique and of no real importance as an argument against the safety of tetrachlorethylene. Therefore, we consider if the necessity for safety (stressed by Lane in the quotation given from his writings at the beginning of this paper) is accepted, as it should be, tetrachlorethylene fully comes up to his demands, as it appears to be even safer than thymol and there appears to be no doubt about its greater efficiency, when the dose of thymol

is kept within the limits recommended by the greatest authority on its use.

"There are other factors also worthy of consideration. The cost of tetrachlorethylene is Rs. 2 per pound, or less for a large quantity, whereas thymol is Rs. 7 or more a pound* and as the full dose of these drugs is practically the same the advantage of tetrachlorethylene in this respect needs no discussion. Further, the sodium bicarbonate and/or the lactose and the gelatin capsules are all to be added to the cost of thymol, and a third factor in increasing its expense is that a considerable amount of time of trained dispensers would be occupied in preparing a large number of doses. Against this, tetrachlorethylene requires no excipients nor capsules and it can be rapidly and accurately measured by anyone with ordinary intelligence, but with no special training as a dispenser†. A final advantage of tetrachlorethylene, according to our method of treatment, is that it is mixed directly with the dose of purgative, shaken up and given immediately in a single dose, whereas thymol is given in one or two portions, which are followed in an hour or two by the purgative, so that the time taken to complete the treatment with this drug is much greater than that occupied in giving tetrachlorethylene.

"Accordingly our final conclusion is that tetrachlorethylene is a better drug for the treatment of hookworm infection on the grounds of lower toxicity, lower cost, greater ease of dispensing, less time taken in completing a treatment, and greater efficiency."

ii. Lane writes of thymol among hookworm-killing drugs, "I think there was, and still is, reasonable evidence that the drug's position is where Ashford put it—that it is the safest of all efficient anthelmintics." Two happenings in Calcutta are dealt with.

The first is a series of papers by MAPLESTONE and MUKERJI. After experiments on cats and many years' experience in treating man they adopted 4 cc. as the dose of tetrachlorethylene for man; but since LAMSON, ROBBINS and WARD (1929) reported that the absorption of this drug varied greatly with species, there is no evidence that experiments on the cat may be taken confidently as evidential for safe dosage in man. In determining safety of anthelmintics it is not the years over which treatments are spread but their numbers that matter (Maurice HALL advised 100,000). As to efficacy these writers tested their results by D.C.F. and treated with tetrachlorethylene three series of patients as follows: treated 28, dose 3 cc. unwormed 16·7 per cent.; treated 81, dose 4 cc., unwormed 61·7 per cent. unwormed and nearly unwormed 75·3 per cent.; treated 25, dose 4 cc. unwormed 36, unwormed and nearly unwormed 88, and this dose brought away 99·1 per cent. of the total bag of necators and 96·1 per cent. of that of ancylostomes. When to 4 grammes of tetrachlorethylene they added 1 cc. of that efficient anthelmintic, oil of chenopodium of B.P. strength, they unwormed 62 per cent. of a series of

* These are pre-war prices in Calcutta.

† "An accurate and efficient measure for dispensing tetrachlorethylene is an old-fashioned type of hypodermic syringe of 5 c.cm. capacity, which has a screw-nut on the plunger-bar to limit the excursion of the plunger so that any desired amount of liquid less than 5 c.cm. in volume can be automatically measured. In the present instance the screw is adjusted so that only 4 c.cm. can be drawn into the syringe. Used without the needle attached, accurate doses can be measured in this way and expelled into already prepared doses of the purgative with the greatest rapidity."

50 and 48 per cent. of one of 25 but they brought away only 38·3 per cent. of the total bag of necators and 23·9 per cent. of that of ancylostomes. These discrepant figures Lane found unconvincing. The dosage of thymol these workers reduced, not, they note, to decry its value, but on the grounds that Ashford had advised that this must be carefully regulated. As they had given no reference for this statement, Lane pointed out that in the summary of his experience written shortly before his death, Ashford reported that while the dose of 60 grains had frequently been reduced for women, yet when he had given over a million doses he had lost almost all fear of the drug and held it to be safer than other efficient anthelmintics. Lane also pointed out that he had been responsible for the treatment in their homes of 50,000 Indians with the full accepted dosage of 60 grains and without anxiety, and suggested that there could have been found 25 Indian patients in Calcutta to whom this could have been given without undue anxiety. The reduced dosage these workers used brought away 0·2 per cent. of the total bag of ancylostomes, a cure rate that would need 500 treatments for unworming, and yet the drug has had a great repute in Egypt, where the infection is by ancylostomes.

The second happening in Calcutta was a review in the *Indian Medical Gazette* of a chapter by Colonel GREIG in Conybear's "Textbook of Medical Treatment." He was criticized in that journal for giving thymol the preference in hookworm treatment on the very poor grounds that it was advised by a particular worker who retired from the tropics 20 years ago and "has obstinately refused to see that, since his day, more effective, more safely administered and cheaper drugs have been introduced." Lane notes that when he collected, ten years ago, the evidence on the matter, he was surprised that he still had to cite thymol as the safest of efficient anthelmintics, that for the last ten years he has had to read all the singularly complete literature on human helminthiasis collected by the staff of the Bureau of Hygiene & Tropical Diseases, and that he has found therein nothing to justify an alteration of his opinion. He again urges the need for unprejudiced re-examination of the matter, seeing how much is at stake in human life and happiness. *C. L.*

HAHN (P. F.), ROSS (J. F.), BALE (W. F.) & WHIPPLE (G. H.). **The Utilization of Iron and the Rapidity of Hemoglobin Formation in Anemia due to Blood Loss.**—*Jl. Experim. Med.* 1940. June 1. Vol. 71. No. 6. pp. 731–736. With 2 charts.

"The formation of hemoglobin in the anemic dog takes place at a very rapid rate. Radio-iron is detectable in the circulating red cells 4 hours after feeding. The absorbed labelled iron is entirely converted into hemoglobin within 4 to 7 days under standard anemic conditions.

"When red cell production has been accelerated by iron feeding or diet factors or when the dose of iron is very small, the dog can turn out as hemoglobin almost all the absorbed radio-iron in 2 to 3 days.

"In general, absorption of radio-iron as shown by utilization to form hemoglobin in anemic dogs is more efficient in small doses in single feeding experiments. As the iron intake is increased the percentage absorption rapidly falls."

[It is essential for clinicians to note the word percentage. For example when a dog weighing 5·8 kgm. was given 1·2 mgm. of iron the percentage of absorption was 60, or 0·72 mgm.; when a dog of 7·9 kgm. was given 115 mgm. or about 100 times as much, the percentage

absorbed was indeed only 3·2, but the quantity of iron that entered the dogs system was 3·7 mgm., five times greater than with the smaller dose. It is of course the quantity of the drug and not the percentage of the dose absorbed that matters clinically.] *C. L.*

BUSSMANN (W.). Hygienische Massnahmen zur Verhinderung der Wiedereinschleppung des Hakenwurms in den deutschen Bergbau. [**Hygienic Measures in preventing the Reinfiltration of Hookworms into German Mines.**]—*Deut. Med. Woch.* 1940. Mar. 8. Vol. 66. No. 10. pp. 267–268.

Examination by an unstated method has been made of the stools of 5,200 miners. The infections found were—hookworms 7, strongyloides 1, ascaris 432, trichuris 444, enterobius 6, taenia 10, or 900 in all making a percentage of 17·5. In former years this had been down to 4·3, the increase being attributed to immigration of workers. The hookworm cases came from Brazil. Apart from pointing out the danger of the introduction of infected persons into mines, the author gives no details of preventive measures. *C. L.*

GALLIARD (H.). Sur la fréquence de la strongyloidose et de l'ankylostomose au Tonkin. [**The Incidence of Strongyloides and Hookworm Infections in Tonking.**]—*Ann. de l'Ecole Supérieure de Méd. et de Pharm. Indochine.* 1939. Vol. 3. pp. 108–114. Also in *Rev. Méd. Française d'Extrême-Orient.* 1940. Jan. No. 1. pp. 1–7.

In Tonking, as elsewhere, the detected infections with Strongyloides are far fewer than those with hookworms. Is that a real or a spurious difference ?

In 64 persons direct examination, [presumably a smear is meant], showed no infection ; faecal culture showed 43 hookworm and 6 strongyloides infections. Strongyloides should have the better chance of infecting man by reason of the multiplication of infective forms that the free living cycle gives to one parasitic larva ; moreover free living stages of Strongyloides survive a lower temperature than do those of hookworms. On the other hand in a mixed culture hookworm larvae survive the Strongyloides forms. But the real handicap to the latter is that, particularly on transfer from one to another host species, viability may greatly lessen ; this, it seems, explains a great degeneration and digestion of young which has been noted, especially in the dog, as they pass down the intestine ; so that although abundant in the duodenum they are absent from the stools. Present methods of examination are then ineffective in the diagnosis of Strongyloides infection. [The duodenal sound to aid Strongyloides diagnosis and floatation for the concentration of hookworm eggs may help to answer the question asked above.] *C. L.*

GALLIARD (H.). Recherches sur la strongyloïdose au Tonkin. Rôle des animaux domestiques dans l'étiologie de l'infestation humaine. [**Domestic Animals and Strongyloides of Man in Tonking.**]—*Ann. Parasit. Humaine et Comparée.* 1939–1940. Vol. 17. No. 6. pp. 533–541. With 5 figs. on 1 plate. [14 refs.]

In Tonking dog and cat rarely have a Strongyloides infection, yet deliberate infection of pups by a human strain is easy, and a heavy skin

infection of this may kill them within a few days. For 4 months after infection adult dogs retain fertile females emitting young, and pass the infection on to adolescent dogs in contact with them. Passage through man does not seem to enhance virulence. The rarity of spontaneous canine infection seems to depend on a restricted exposure to it. Worms from human sources, which have both direct and indirect cycles, show only the indirect cycle in the dog; so when FÜLLEBORN found only this indirect cycle in the dog in the Far East he did not in fact give evidence for two species. These variations of virulence according to host source make the epidemiology very complex. *C. L.*

FAUST (Ernest Carroll) & DE GROAT (Albert). **Internal Autoinfection in Human Strongyloidiasis.**—*Amer. Jl. Trop. Med.* 1940. May. Vol. 20. No. 3. pp. 359–375. With 7 figs. on 2 plates. [28 refs.]

This is a wide survey of the subject, and results of examination of certain organs of a boy of 12 who died from the infection are given.

The boy, greatly emaciated and with abdominal pain, died shortly after admission to hospital about the beginning of the fourth week of his illness. Only a limited autopsy was permitted.

"The case reported in this communication provides additional evidence demonstrating a relatively heavy invasion of the deeper layers of the bowel wall and liver by filariform larvae derived from mother worms situated in the overlying mucosa. Except for a localized eosinophilic response around the migrating worms no cellular reaction was provoked by this invasion. This stands in marked contrast to the picture of leukocytosis with hypereosinophilia which characterizes the usual case of acute strongyloidiasis.

"Self-infection in strongyloidiasis may result: (*a*) from the perianal invasion of filariform larvae; (*b*) from the invasion of the mucosa of the lower levels of the bowel by filariform larvae which have originated from sites of infection at higher levels; (*c*) from the penetration of filariform larvae into the deeper layers of the bowel at the same level where they were produced in the mucosa, or (*d*) from unmetamorphosed rhabditoid larvae massively penetrating through the muscularis mucosae into the deeper layers of the bowel wall.

"Probably all persons harboring *Strongyloides* are potential subjects of self-infection.

"Self-infection with *Strongyloides stercoralis* may be controlled, or at least measurably reduced, by heeding certain dicta of personal hygiene, by providing adequate nutrition and hematopoietic stimuli and by diagnosis and treatment of the infection." *C. L.*

HSÜ (H. F.), FAN (Y. C.), T'AN (C. C.) & CH'IN (K. Y.). **Two Cases of Heavy Infestation by** *Ascaris lumbricoides.*—*Chinese Med. Jl.* 1940. Feb. Vol. 57. No. 2. pp. 168–175. [11 refs.]

In the first case a dirty patient from the Peiping Municipal Psychopathic Hospital died of a torn and perforated intestine. At operation 1,533 ascaris worms were removed from the peritoneal cavity, the condition did not allow the operation to be completed and at autopsy the number found brought the total to 1,978. Of these one lay in each Fallopian tube, while numbers still in viscera were—oesophagus 10, stomach 56, duodenum 5, jejunum 90, ileum 69, colon 7. The worms escaped from the intestine in a rupture 205 cm. above the

ileocaecal valve. The second patient after taking santonin passed 320 well grown worms. The proportion of males to females was 1 to 1·02 in the first and 1 to 2·2 in the second patient. *C. L.*

PENEY (M.). Méningite aigue d'origine ascaridienne. [**Acute Meningitis from Ascaris.**]—*Bull. Soc. Path. Exot.* 1940. Feb. 14. Vol. 33. No. 2. pp. 132–134.

A boy of 14 had a temperature of over 40°C., had severe headache, general hyperaesthesia and lay like a gun dog whining [" couché en chien de fusil, geignant "]. Spinal puncture showed a turbid fluid, with no bacteria, no glucose, many lymphocytes and a few normal polymorphs. A second puncture next day had the same turbidity and, while all was in readiness to inject antimeningitic serum into the spinal meningeal cavity forthwith, his father pointed out that the boy had passed an Ascaris in his stools. So the injection was put off, particularly as his temperature had fallen to 38·6°C., he was given santonin, expelled some fifty Ascaris, and was cured. In the differential diagnosis stress is laid on the desirability of determining whether the absence of glucose here noted is significant. *C. L.*

BERGER (Julius) & ASENJO (Conrado F.). **Anthelmintic Activity of Crystalline Papain.**—*Science.* 1940. Apr. 19. Vol. 91. No. 2364. pp. 387–388.

Crystalline papain in adequate strength and over an adequate time digests *Ascaris lumbricoides in vitro.*

Each worm was placed in a test tube measuring 150 by 15 mm., the fluid being added and the tube incubated at 40°C. The crystalline papain was dissolved in 12·5 cc. of 0·067 M. phosphate-phthalate buffer *p*H 5. The percentage strengths of the enzyme fluid were 0·005, 0·02 and 0·11. All tests were made in triplicate. In the control the same fluid without papain was presumably used and the worms in it showed no change in 16 hours ; in the fluid of 0·005 percentage two of the three worms were ulcerated within this period, in 0·02 percentage all were badly ulcerated and partly digested, in 0·11 percentage all were completely disintegrated and well digested. *C. L.*

MISCELLANEOUS.

GIEMSA (Gustav) & NAUCK (Ernst G.). Eine Studienreise nach Espirito Santo. Volksbiologische Untersuchung einer deutschstämmigen Bevölkerung in Mittelbrasilien als Beitrag zum Akklimatisationsproblem. [**A Study Tour in Espirito Santo.**]—*Hansische Universität Abhandlungen a.d. Gebeit d. Auslandskunde.* 1939. Vol. 48. Reihe D. Med. u. Vet. Vol. 4. pp. x + 76. With 71 figs. & 1 map.

There is only one short chapter in this publication which is of interest to readers of the *Tropical Diseases Bulletin*, namely, that dealing with nosology. Other chapters are concerned with soil, climate and traffic,

the story of German settlement there, agriculture, clothing, housing, food, population mainly as regards Germans, and the religions which they are reported to profess.

There is a small well-equipped private hospital open to any who can afford the fees. Midwives practise in the country, but their methods are said to be antiquated ; mothers are delivered standing or squatting, all doors and windows closely shut, for superstitious reasons, and cleanliness after labour conspicuously wanting. There are dentists and from the general dental state of the people their services are needed, the sight of persons with teeth stopped with gold or lead is, as the authors remark, really surprising. As regards disease, yellow fever occurs, and malaria, but not widely spread ; the chief sites of the latter are the borders of the Rio Doce and its northerly tributary, Rio Pancas. Neither the type of malaria nor the prevalent or infecting mosquitoes are mentioned. Visceral leishmaniasis occurs, but has so far been seen in the northern districts only. Blood examinations for *T. cruzi* have not, up to the present, revealed any. Amoebic dysentery is rare. Hookworm is common and *opilação*, a comprehensive and vague term, is largely associated with ankylostomiasis ; practically every school-child is infested with this, and many of them with ascaris, trichuris and enterobius. Schistosomiasis (*S. mansoni*) is present but not rife. Of epidemic infective diseases, typhoid is found in more or less limited outbreaks, usually water-borne, and measles, German measles, diphtheria and scarlet fever, usually mild " as in nearly all tropical countries " [which, of course, is not the case, at all events in the first and third of these]. The alastrim type of variola is sometimes met with. There is very little tuberculosis and, state the authors naively, venereal disease is unknown among the German colonists [Dr. Goebbels was not a member of the party]. Ticks, chigoes and gadflies are pests, the last often causing boils. Many deaths are due to snake bite [no snakes are named]. The register of causes of death is unreliable, as only a small proportion are medically certified. The book is well produced and is embellished with some excellent photographs.

H. H. S.

REVIEWS AND NOTICES.

HEWITT (Redginal) [Sc.D., Department of Protozoology, School of Hygiene and Public Health, The Johns Hopkins University]. **Bird Malaria.**—*Amer. Jl. Hyg.* Monographic Series. 1940. July. No. 15. pp. xvii + 228. With 13 plates & 33 figs. [Bibliography.] 1940. Baltimore : Johns Hopkins Press. [7*s.* 6*d.*]

Fifty-six years have elapsed since the discovery by DANILEWSKY of malaria parasites in birds, and during that period hundreds of papers, devoted to various aspects of avian malaria, have been published. As in other branches of comparative parasitology, the chief stimulus for the intensive study of the infection in birds was provided by the fact that the causal organisms are so closely related to those of human malaria and their life-cycle and behaviour in both vertebrate and invertebrate hosts are similar. It was, therefore, natural to turn to

bird malaria for the solution of many of the problems of the human disease.

The earliest and best known example of the application of the knowledge obtained from the study of bird malaria was Ross's discovery of the life-cycle and transmission of the avian parasite. More recently attention has been concentrated on the study of chemotherapeutic agents, resulting in the discovery of plasmoquine and atebrin. Much insight into the mechanism of immunity in malaria has been gained by the study of immune reactions in infected birds.

There are many more obscure questions in human malaria, and there can be no doubt that further investigations on avian malaria will continue to contribute to their solution. Unfortunately, the accumulated data on malaria in birds are widely scattered and can only be gleaned by a laborious perusal of the literature in several languages, a difficult task even for a specialist situated within reach of the best scientific libraries.

The purpose of the present monograph was to bring together all the available information and to provide a complete account of our present knowledge on bird malaria. It is fitting that this work should have been undertaken by an American malariologist, since a large proportion of the investigations on avian malaria in the past twenty years have been carried out in the United States, chiefly by associates of the School which Dr. Hewitt represents.

The subject matter is divided into 11 chapters. The first deals with the discovery of the parasites and the early history of avian malaria investigations. It is interesting to note that over three-fourths of all papers on this subject date since 1923. In the second chapter information is given about the geographical distribution of bird malaria, and a list of hosts—completed up to January 1940—is provided. Unfortunately it contains only the names of the hosts and authors, but does not mention the specific names of the plasmodia or the localities where they were found. Chapter 3 provides practical instructions for the maintenance of experimental birds (canaries), methods of inoculation and the technique for the preparation and staining of blood films and sections, and for counting the parasites. There are also useful data regarding the normal blood picture (illustrated by a coloured plate) and tissues in birds.

Chapter 4 is devoted to systematics. The total number of avian species of *Plasmodium* recorded up to the present is about 40, of which the author accepts only 12 as valid, the remaining ones being synonymous with one or another of these. For the identification and differential diagnosis of the recognized avian species a useful key—originally compiled by MANWELL—is provided ; in addition to this all the recorded species are tabulated together with their type-hosts, localities and authors. The 12 valid species are effectively illustrated by black-and-white figures, showing the most important stages for each species. Under the heading " Characteristics of laboratory infections," Chapter 5 deals briefly with the life-cycle and localization of the parasites in the bird, with the course and periodicity of the infections (tabulated for each species), and the methods of studying these phenomena. The symptomatology and pathology of the infection in birds are considered in Chapter 6, while in Chapter 7 a detailed account is given of immune reactions in avian malaria, the study of which has thrown much light on immunity in human malaria. The next chapter (8) describes the effect of drugs and chemicals upon the infections.

It is owing to the similarity of the response of both avian and human parasites that the anti-malarial drugs tested on birds proved to be successful in the treatment of human malaria. Since no drug has yet been found which destroys all stages of the parasite in the vertebrate host, chemotherapeutic investigations on bird malaria will continue until such a remedy is discovered. In this chapter details are given regarding dosage, methods of selection and administration of drugs, and the mode of their action in birds.

Chapter 9 is devoted to a description of the sexual cycle in and transmission by mosquitoes. Only a brief outline is given of the actual stages of development, the stress being laid mainly on gametogenesis and the conditions governing the sexual processes in avian plasmodia. In the section on transmission a useful list is given of the known vectors of the avian parasites. The technique of rearing and feeding these insects and the epidemiology of bird malaria are also discussed. A whole chapter (10) is allotted to the puzzling exo-erythrocytic stages of development in *Plasmodium* and to the fate of the sporozoites in the vertebrate host, questions which so far remain unsolved. In the last chapter (11) a number of useful suggestions are given regarding problems for investigation in avian malaria. There is a bibliography containing 532 entries and a subject index.

Dr. Hewitt has rendered a useful service in providing the first authoritative and up-to-date handbook on bird malaria, which will be appreciated not only by malariologists—to whom it is almost indispensable—but also by parasitologists in general. Those desiring to pursue the subject deeper will find numerous references to original publications in the text.

The book is mainly intended to provide practical "information relative to the material, methods and results in the entire field" of bird malaria, and in this respect it will amply serve its purpose. However, the addition of a few extra pages, containing brief descriptions of each of the chief avian species of *Plasmodium* and a fuller account of the life-cycle of the parasite, would have made the monograph more comprehensive and enhanced its value for a wider circle of readers. As it is, the only recent systematic description of the avian parasites is a paper by the late Dr. GIOVANNOLA (1939) written in Italian [this *Bulletin*, 1940, Vol. 37, p. 367].

The publishers of this monograph are to be commended both for its general appearance and low cost. Only a few misprints have been noticed, among them an amusing mis-spelling of the adjective "humoral," which is repeatedly rendered as "humeral."

C. A. Hoare.

Printed under the authority of HIS MAJESTY'S STATIONERY OFFICE
by the South Essex Recorders, Ltd., Ilford.

(2445) Wt. P2975/238 1725 2/41 S.E.R. Ltd. Gp. 432.

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